

COMPUTER ASSISTED COMPOSITION

*Practical perspectives on computer assisted composition,
from hands-on to machine learning and AI*

Reflection on the RIM's role as "Interface"



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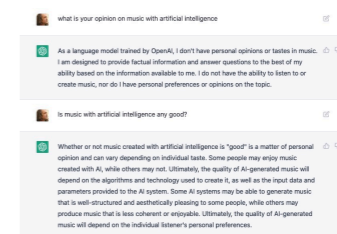
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what is your opinion on music with artificial intelligence



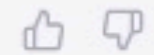
As a language model trained by OpenAI, I don't have personal opinions or tastes in music. I am designed to provide factual information and answer questions to the best of my ability based on the information available to me. I do not have the ability to listen to or create music, nor do I have personal preferences or opinions on the topic.



Is music with artificial intelligence any good?



Whether or not music created with artificial intelligence is "good" is a matter of personal opinion and can vary depending on individual taste. Some people may enjoy music created with AI, while others may not. Ultimately, the quality of AI-generated music will depend on the algorithms and technology used to create it, as well as the input data and parameters provided to the AI system. Some AI systems may be able to generate music that is well-structured and aesthetically pleasing to some people, while others may produce music that is less coherent or enjoyable. Ultimately, the quality of AI-generated music will depend on the individual listener's personal preferences.

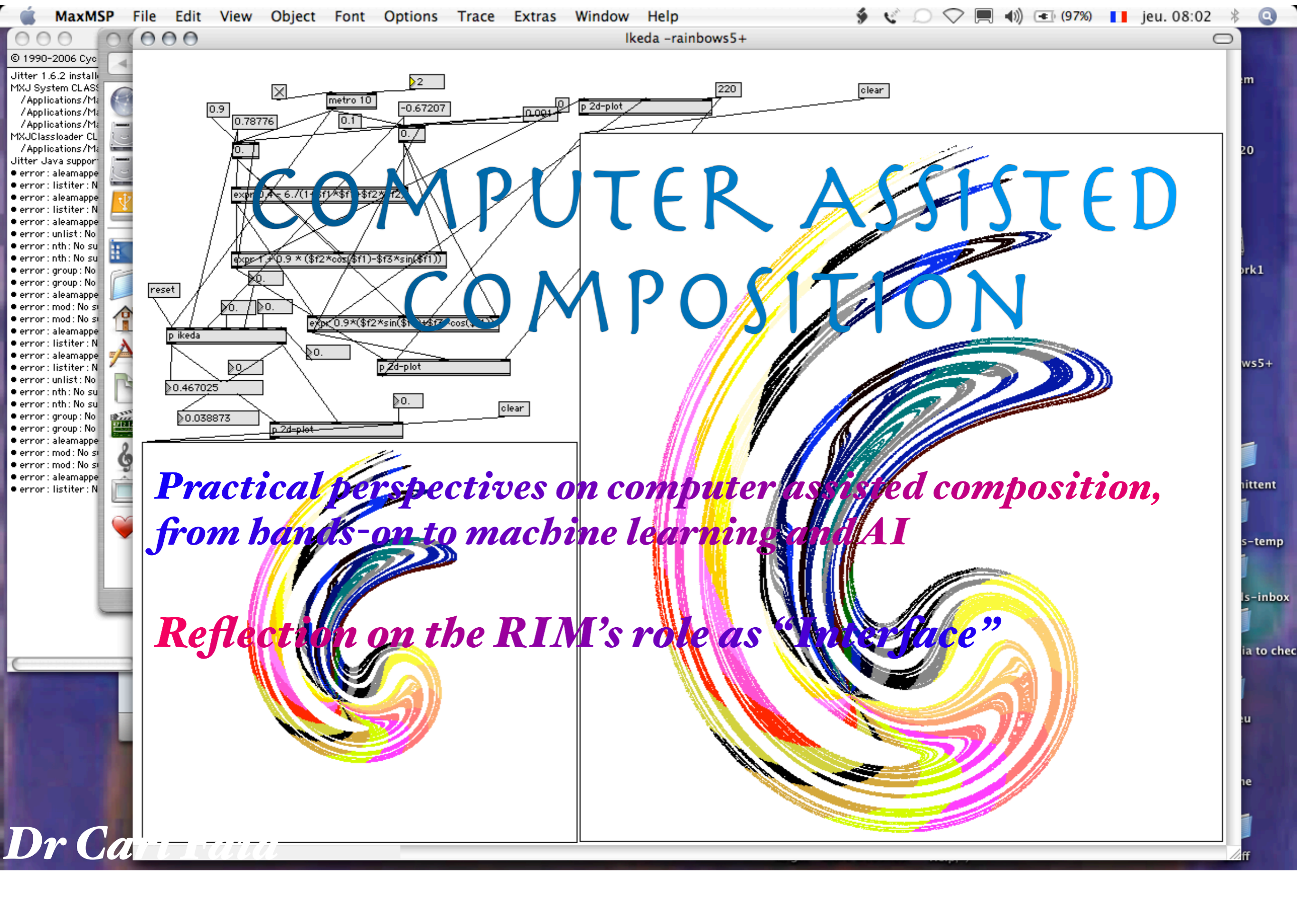


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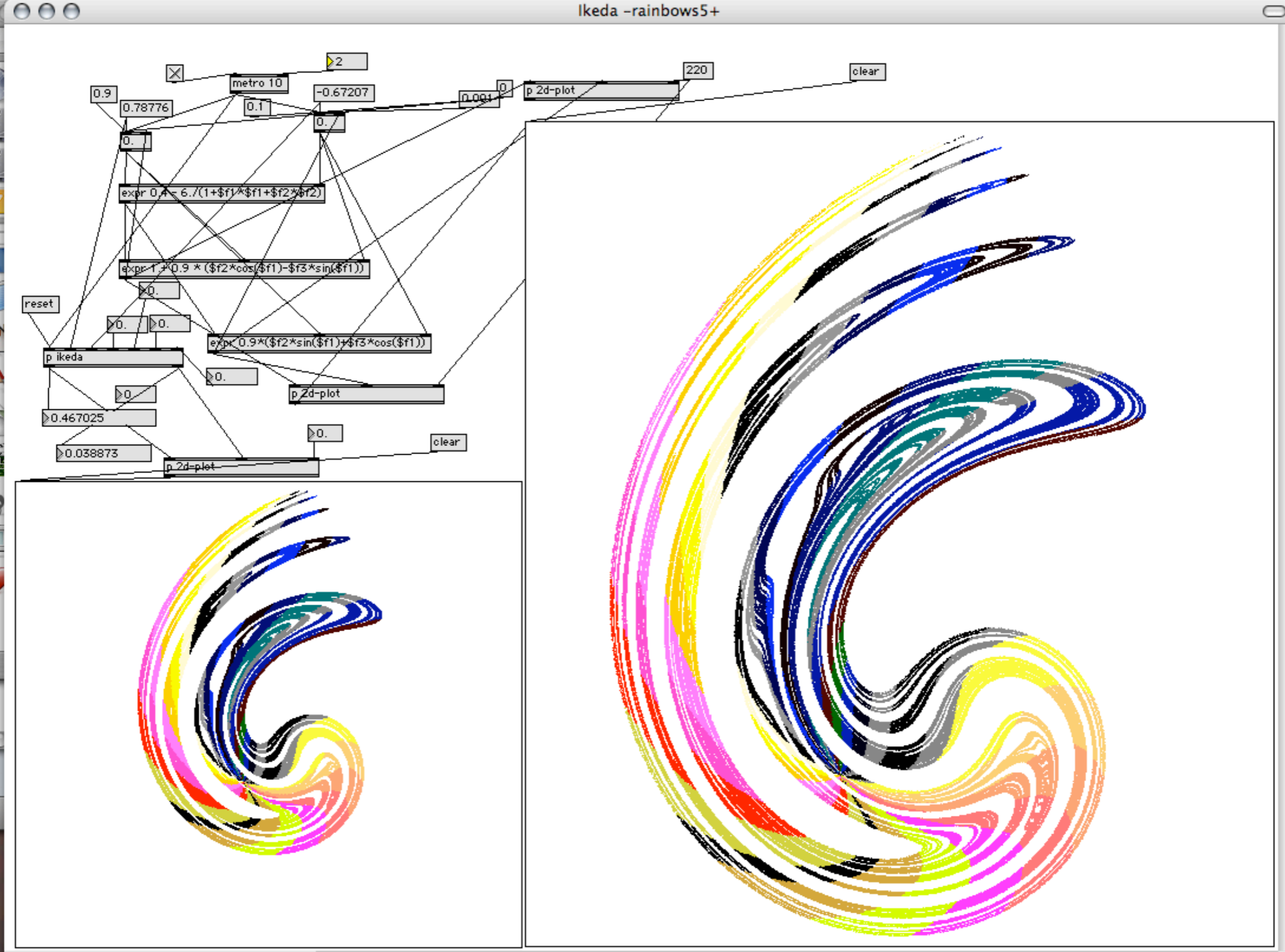


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The Good Old Days

The Good Old Days



CX5M

The Good Old Days



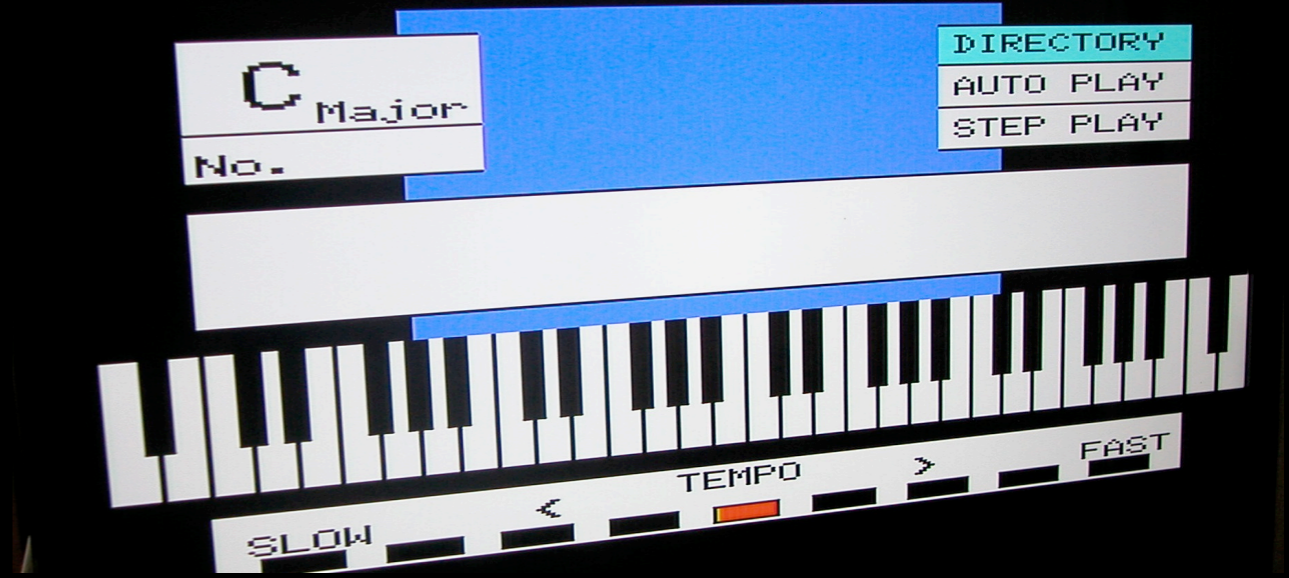
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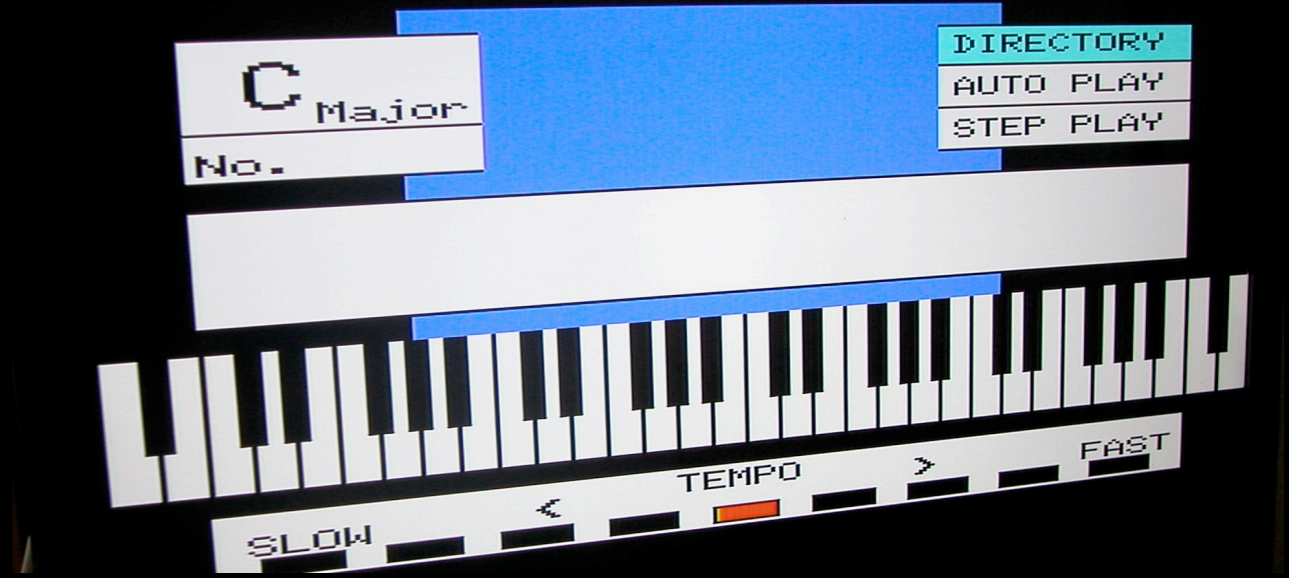
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The Good Old Days



CX5M



The Good Old Days



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John Casken, Ligeti/Lutoslawski/Messiaen, chord rotation // JoAnn Kuchera-Morin

Aarhus

Per Nørgård

Infinity series

Karl Aage Rasmussen

Hans Abrahamsen

Acanthes

Grisey

(Birtwistle (remind me to tell the story))

IRCAM

Murail (process)

Puckette/Manoury (live, aléatoire)

MaxAlea

Diphone

RepMus !!

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Per Nørgård's *Infinity Series*
 First 16 integers (pitches) and their indices
 $G = 0$

integers:
 0 1 -1 2 1 0 -2 3 -1 2 0 1 2 -1 -3 4

indices:
 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

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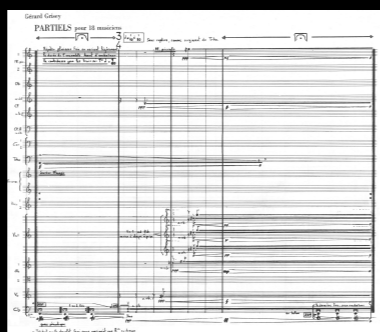
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Aarhus Per Nørg

ns Abrahamsen

Gérard Grisey

PARTIELS pour 18 musiciens

← $\frac{3}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ → Sans rupture, comme surgissant du Trbn.

1 Répéter plusieurs fois en variant légèrement
la durée de l'ensemble. Avant d'enchaîner
la contrebasse joue les trois mi $\text{♩} = 60$

Fl. piccolo ff mf

Ob

msob

Cl

Cl. B

Cor 1

Cor 2

Trbn

Fiscorn.

Perc 1

Perc 2

Vn 1

Vn 2

Vc

Cb

quasi périodique

1 ou 2 fois

au taton

Reprendre. Puis, pour enchaîner

Trébuchet sur le chevalet, femi sonne quasiment une 8^{va} au dessus

Acanthes Gris

tell the story))

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MaxAlea Diphone

Reprimus !!

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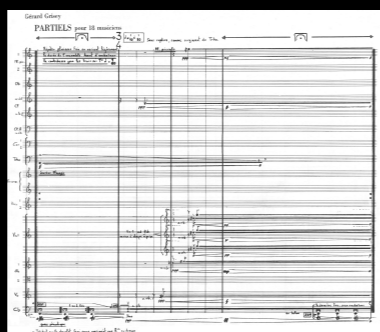
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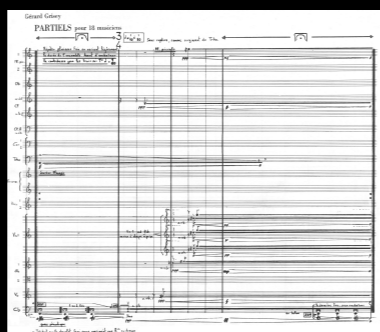
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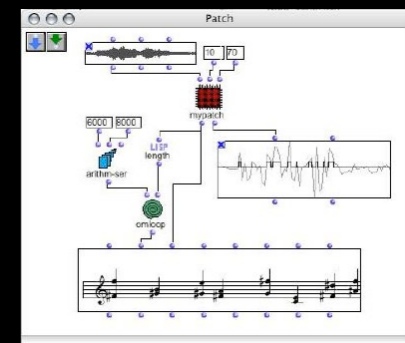
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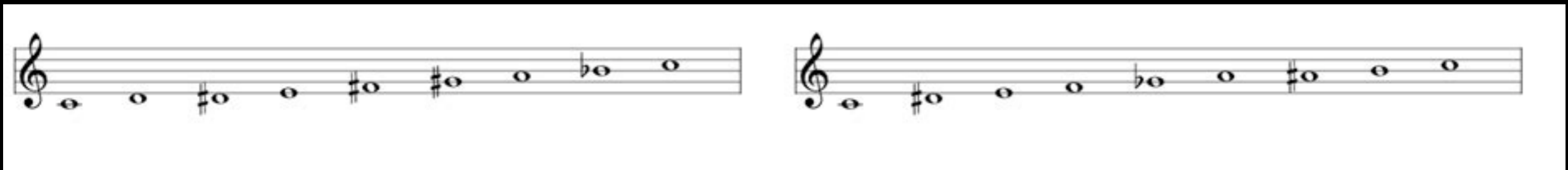
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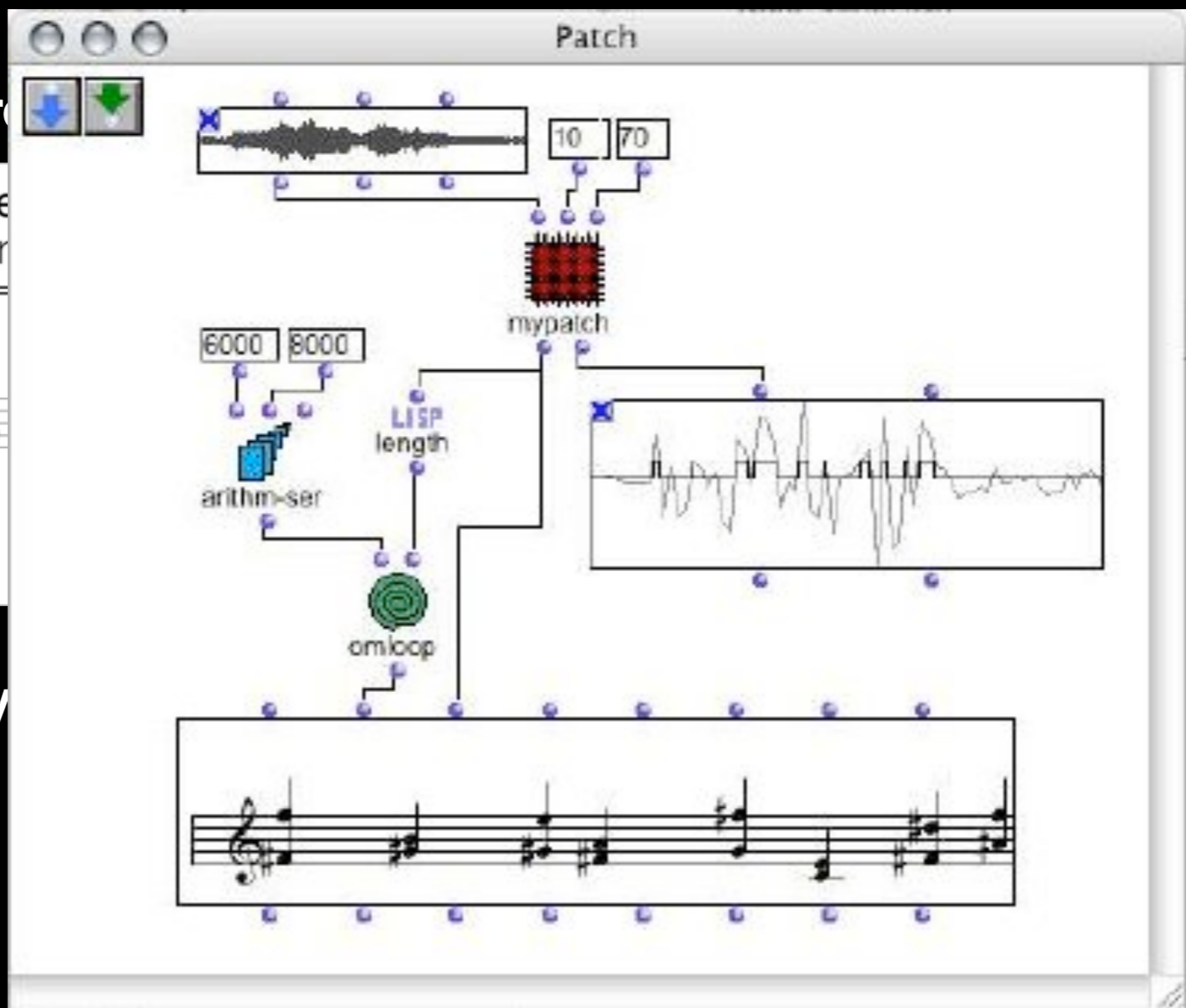
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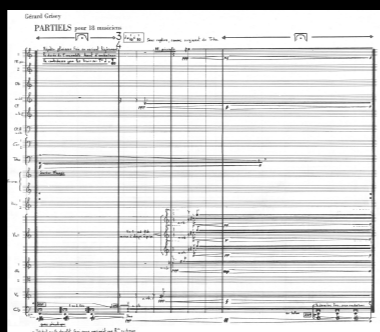
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number theory and op

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golden mean/ratio, Fibonacci numbers,

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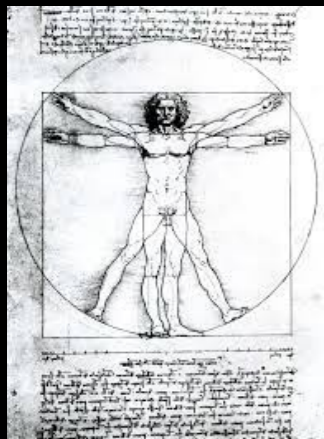
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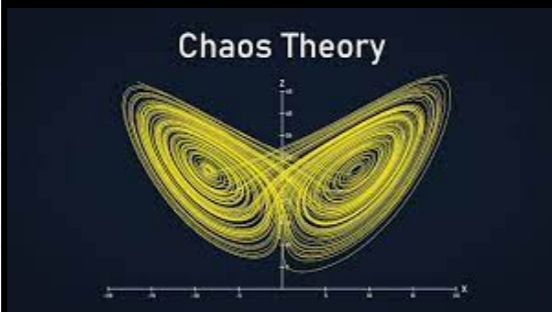
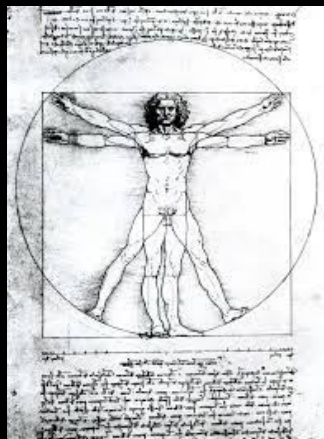
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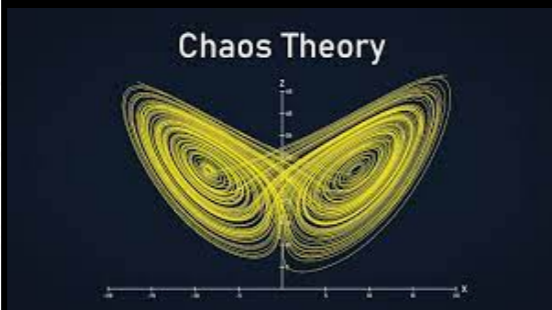
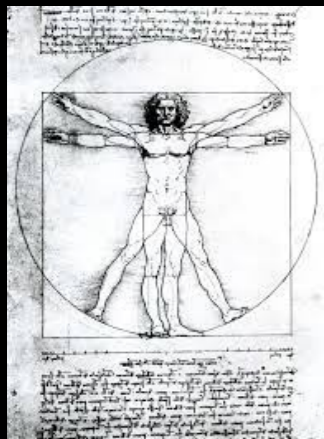
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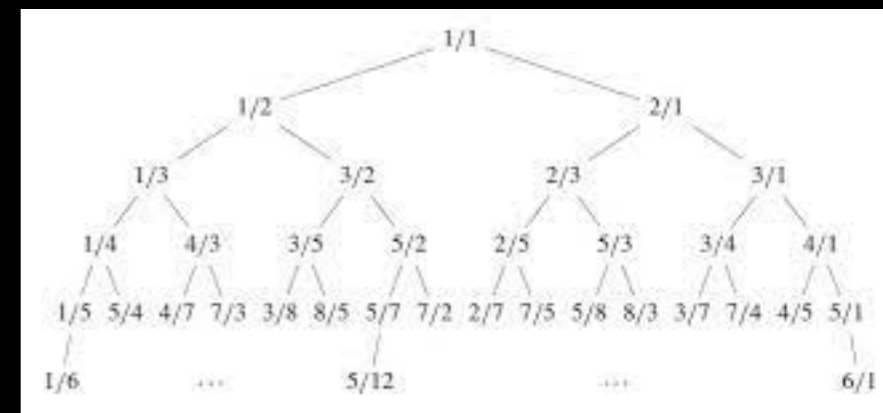
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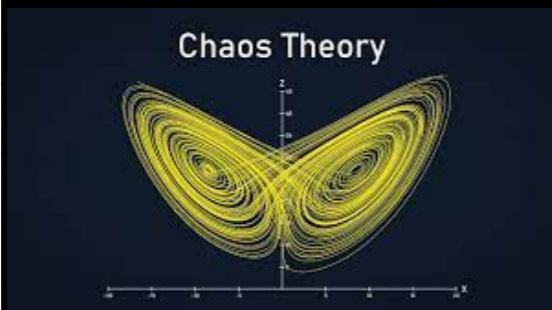
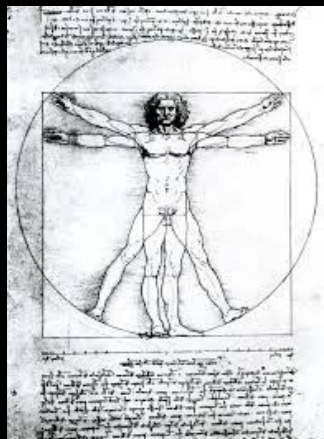
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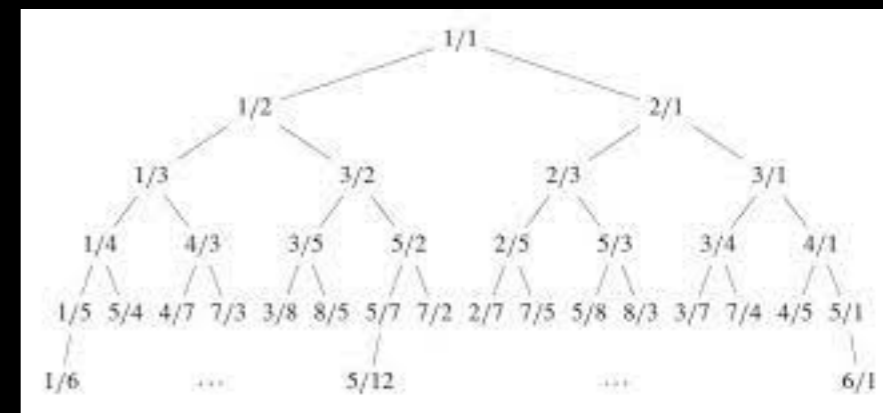
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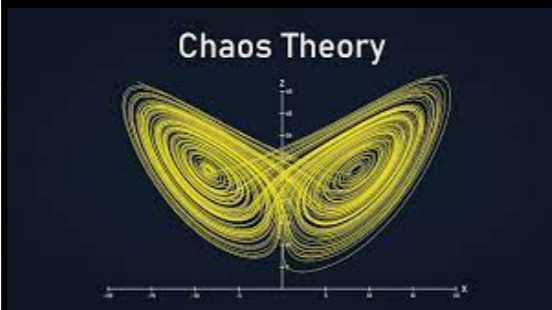
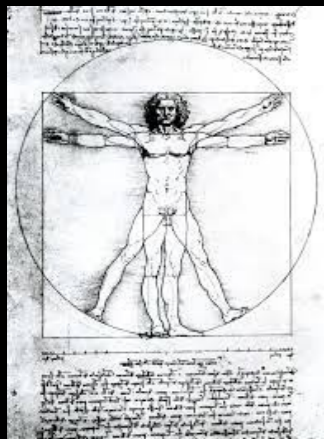


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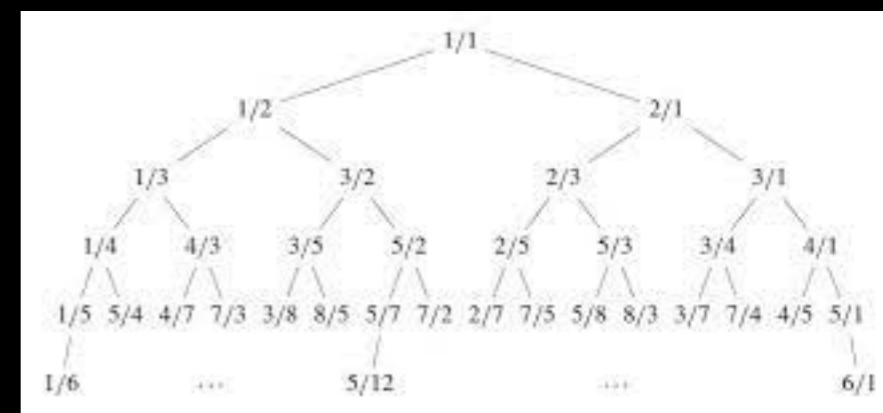
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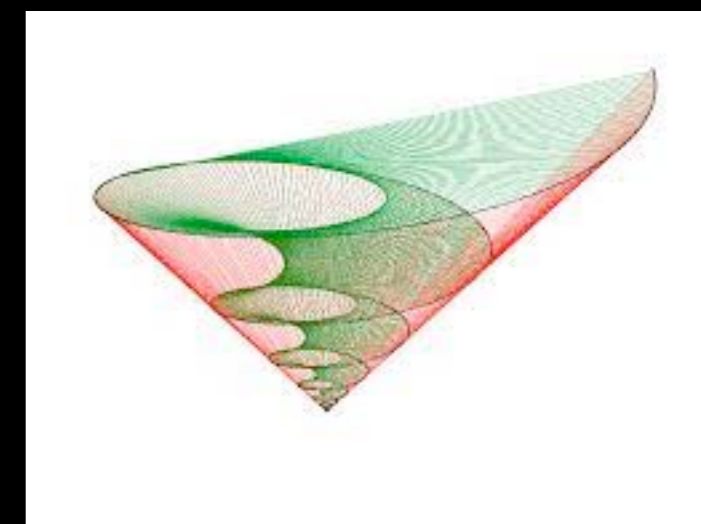
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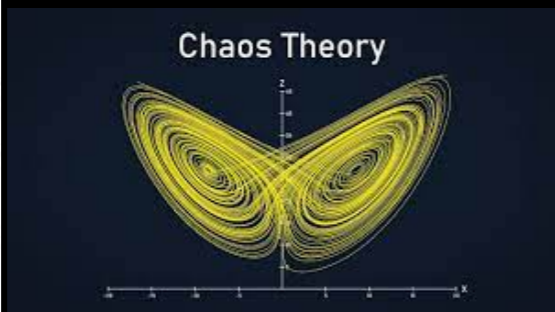
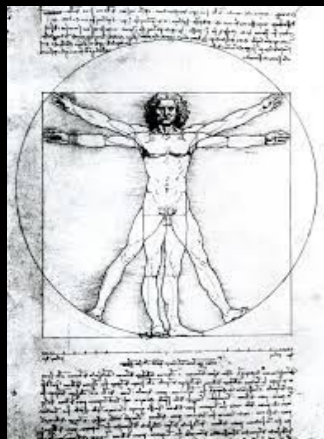
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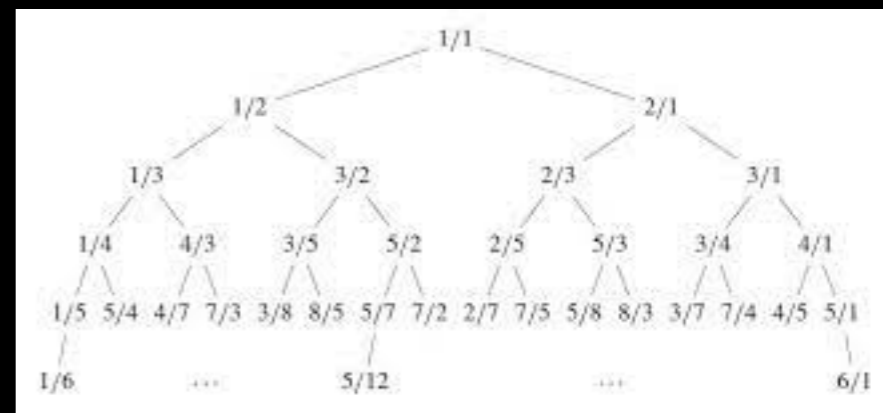
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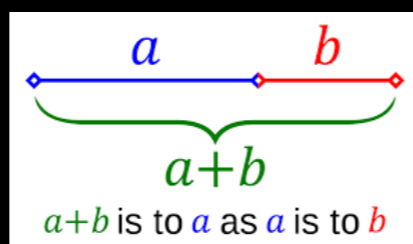


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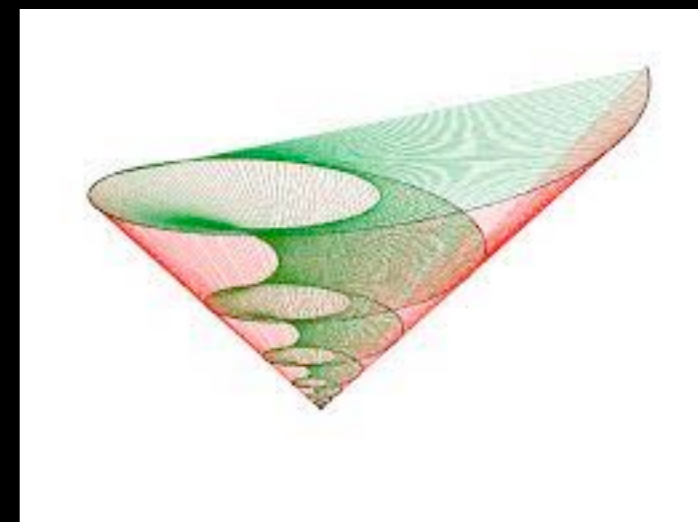
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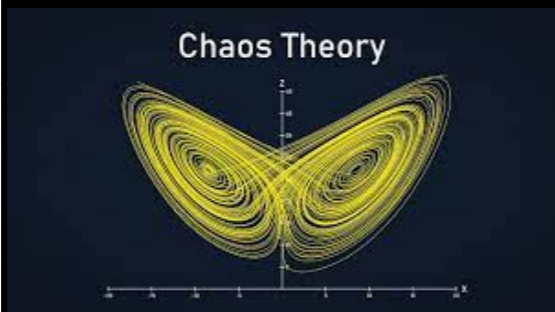
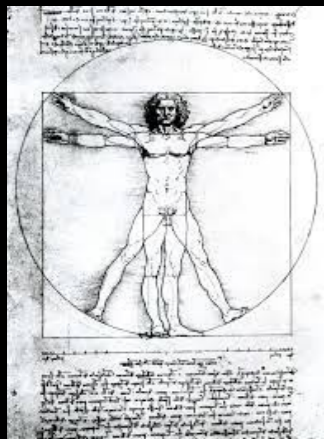
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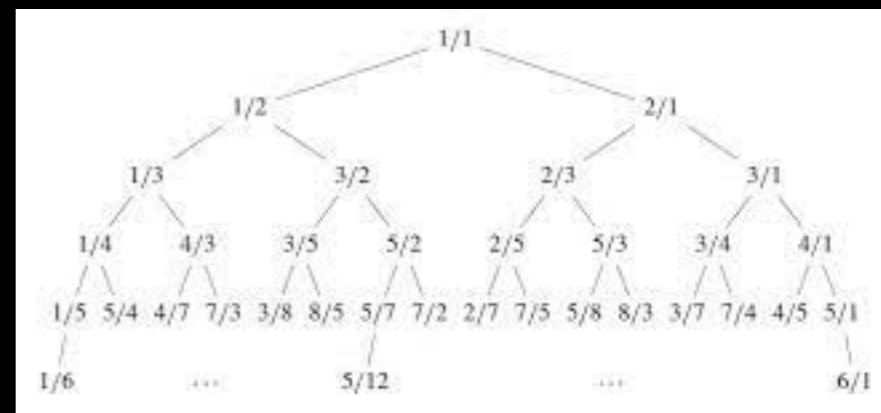
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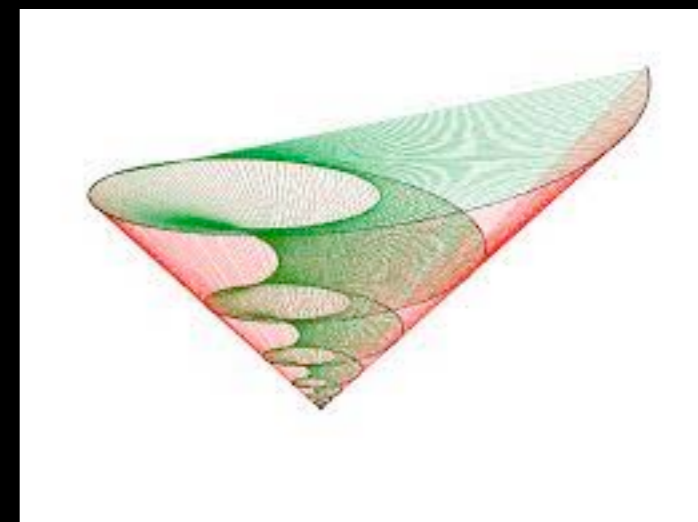
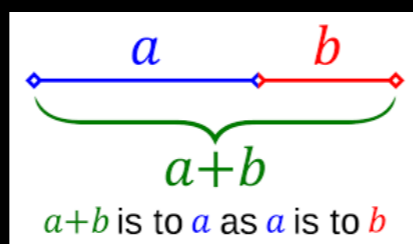


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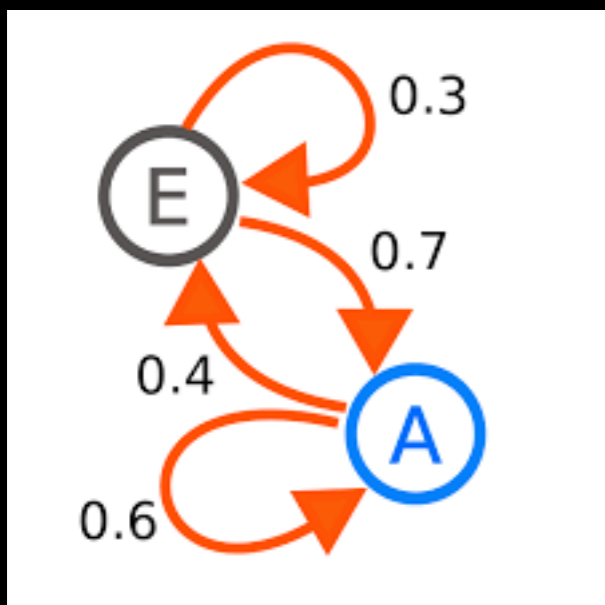


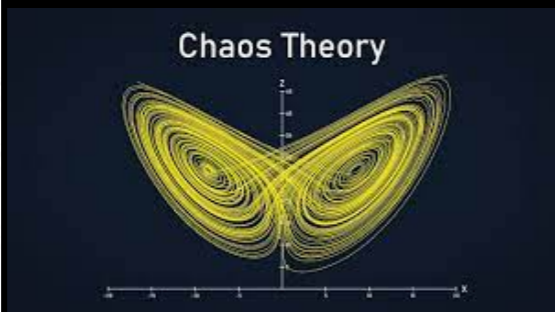
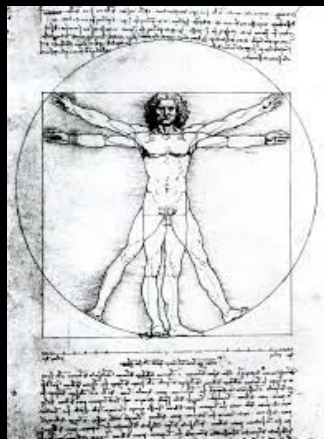
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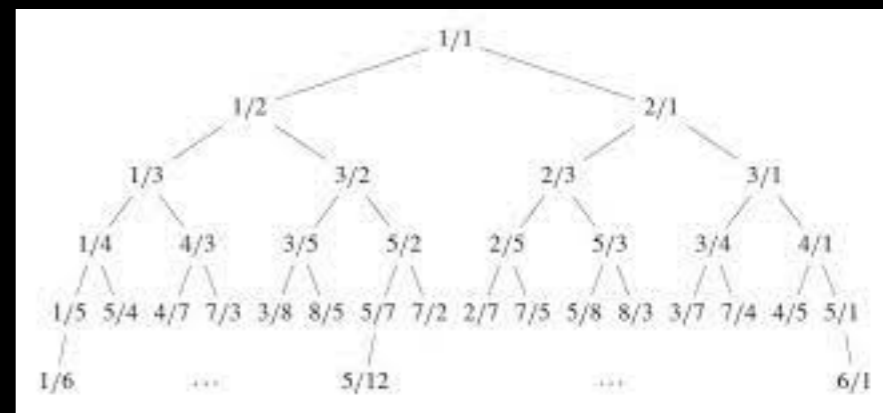
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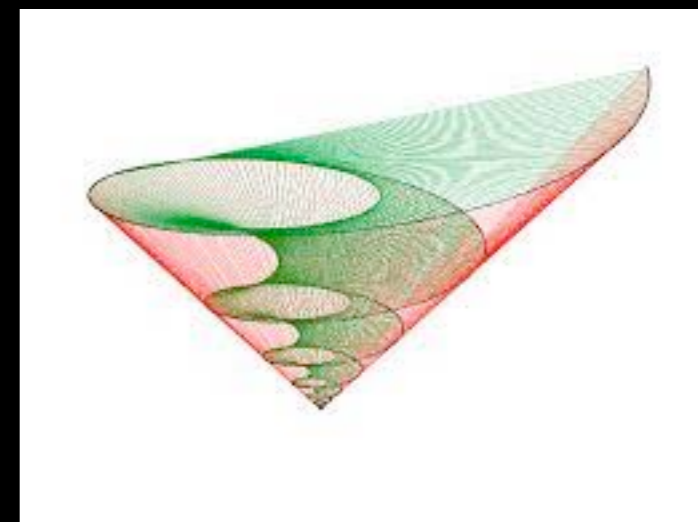
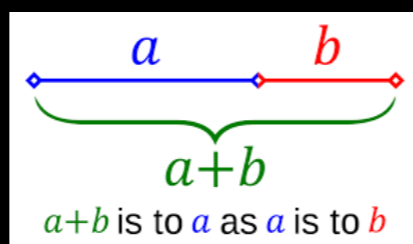


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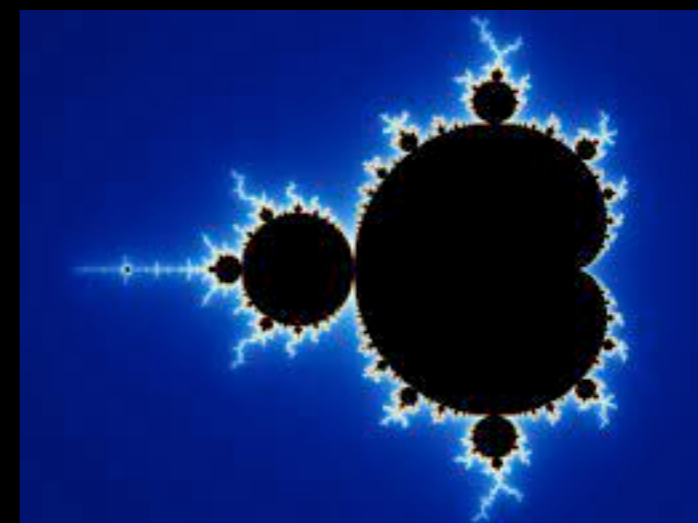
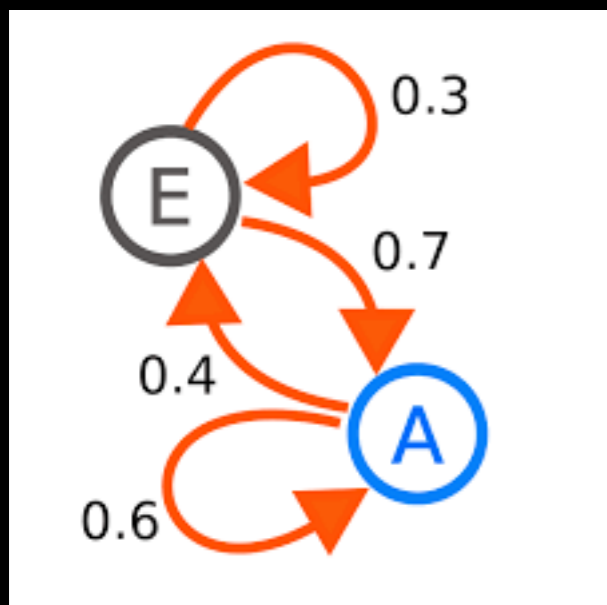


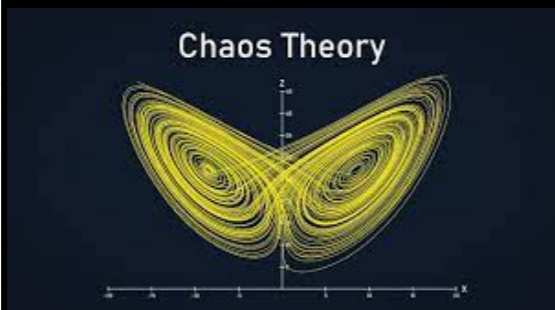
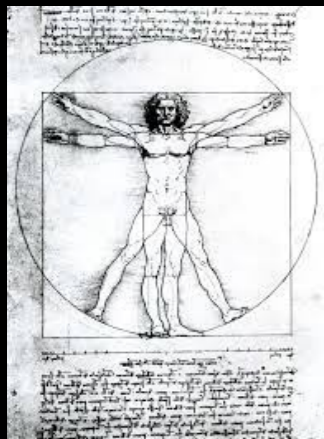
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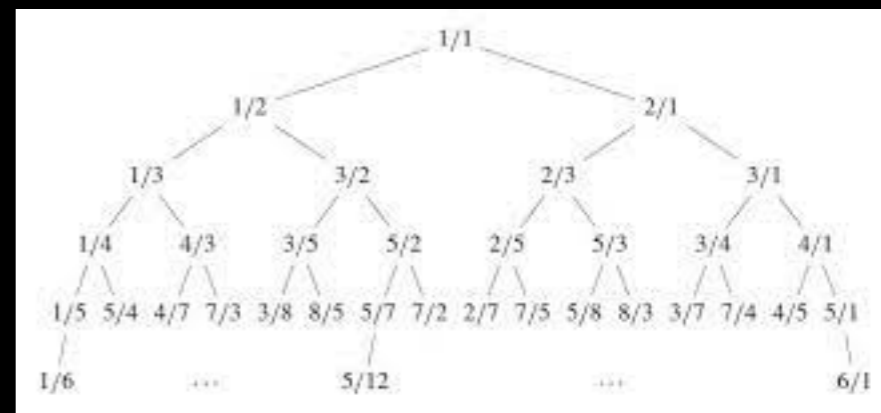
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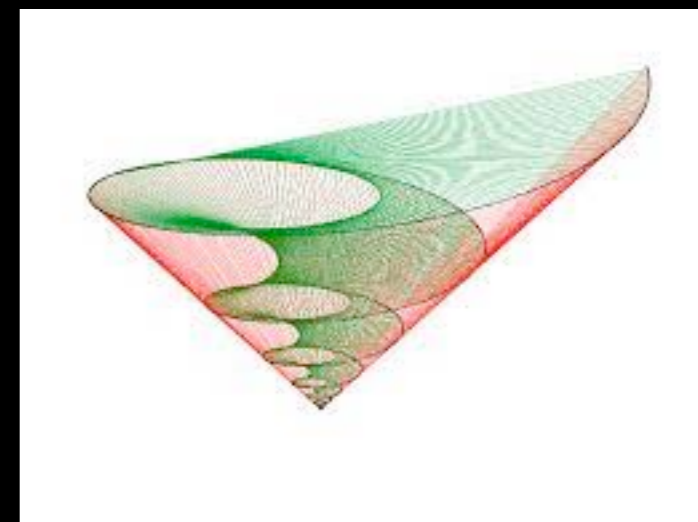
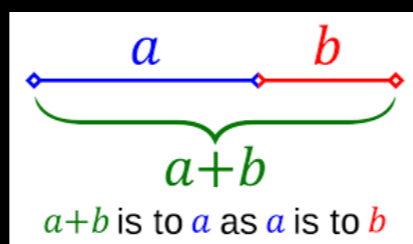


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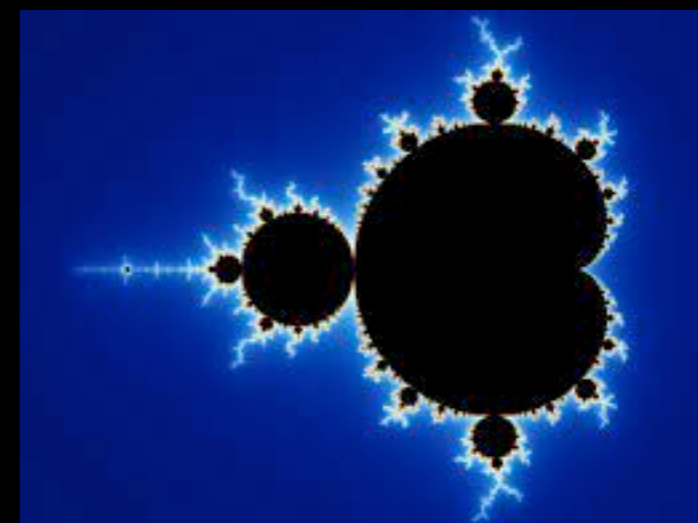
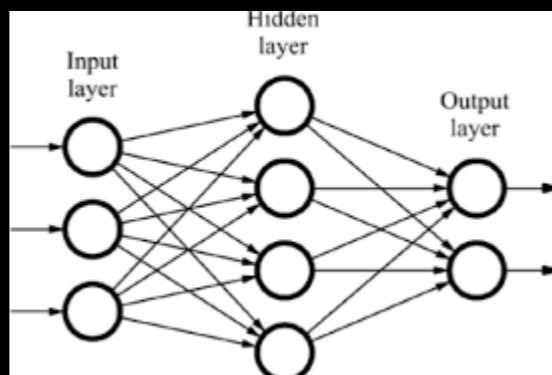
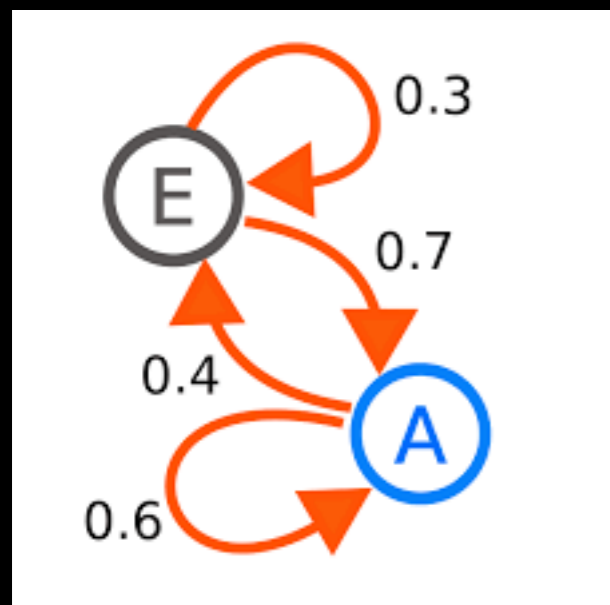


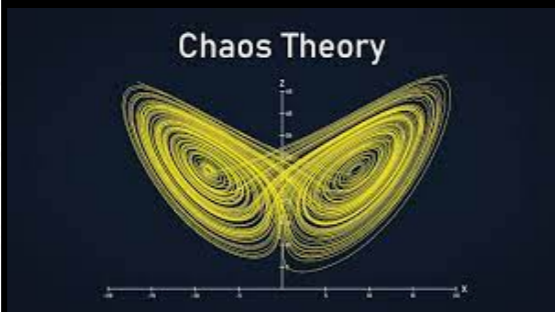
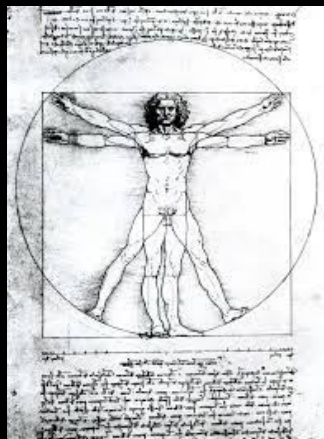
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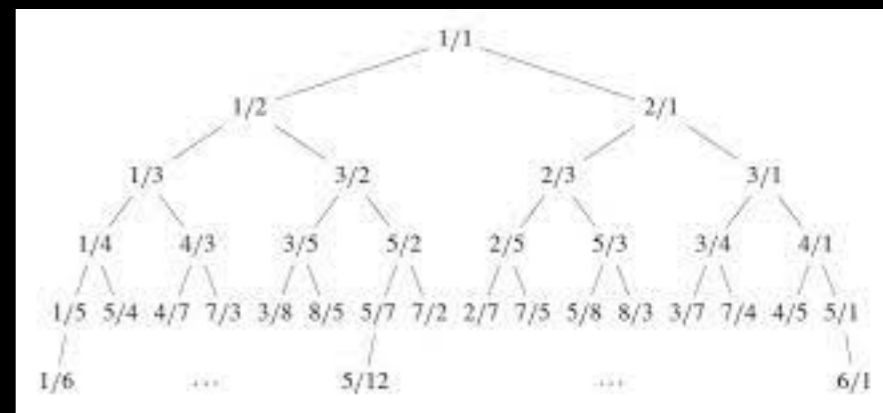
neural nets...



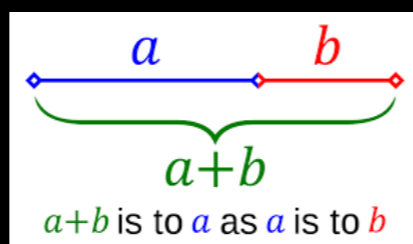


Abusing algorithms... until they abuse us

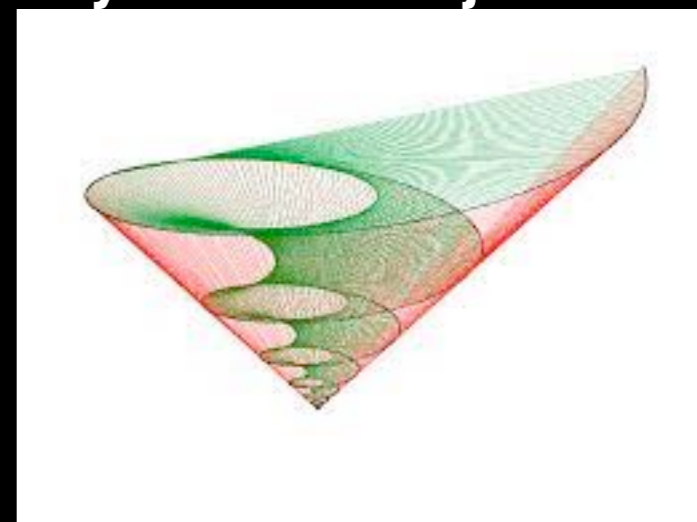
number theory and op



golden mean/ratio, Fibonacci numbers,

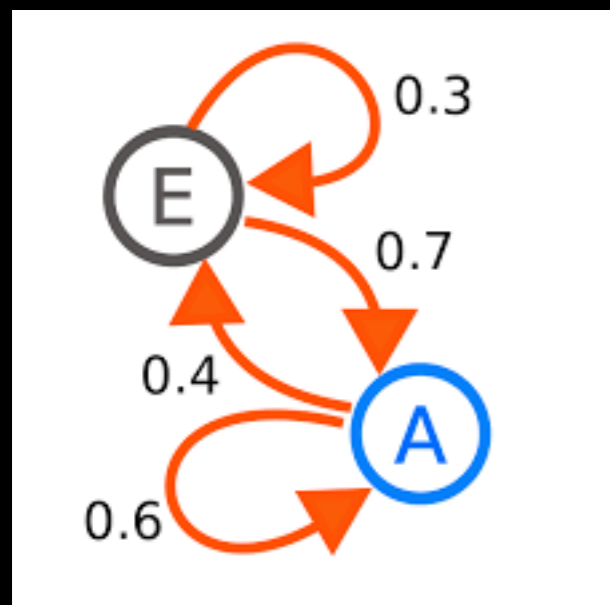


syracuse conjecture



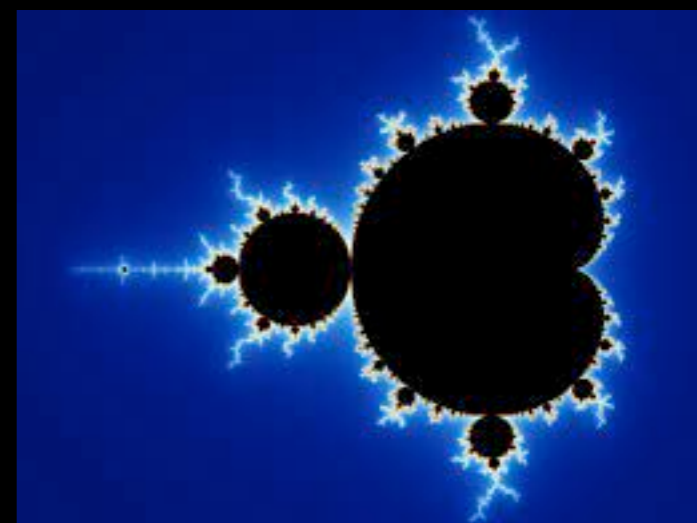
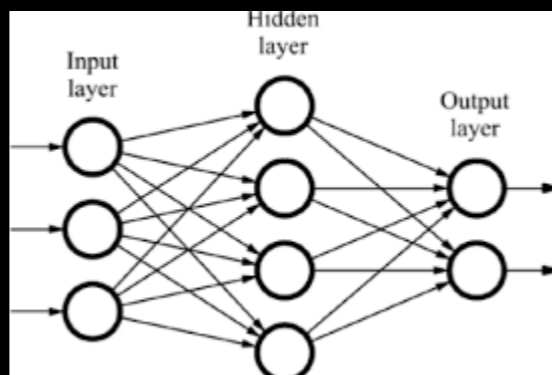
anyflavor conjecture

markov chains, probabilities, Monte Carlo



chaos theory, fractal geometry, complexity theories

neural nets...















le procès d'intention

le procès d'intention

An Angry Darkness

le procès d'intention

An Angry Darkness

Classical Piano

The image shows a musical score for a piece titled "An Angry Darkness" by Classical Piano. The score is written for piano and consists of two staves: a treble clef staff and a bass clef staff. The time signature is 4/4. The key signature is one sharp (F#), indicating the key of D major or F# minor. The score begins with a first measure marked with a "1" above the treble staff. The treble staff contains a quarter rest, followed by an eighth rest, a quarter note with a flat (Bb), and a quarter note with a flat (Bb). The bass staff contains a quarter note with a sharp (F#) and a quarter note with a sharp (F#). The second measure of the treble staff contains a quarter note with a flat (Bb), a quarter note with a flat (Bb), and a quarter note with a flat (Bb). The bass staff contains a quarter rest. The third measure of the treble staff contains a quarter note with a sharp (F#) and a quarter note with a sharp (F#). The bass staff contains a quarter note with a sharp (F#) and a quarter note with a sharp (F#). The score ends with a double bar line.

le procès d'intention

An Angry Darkness

Classical Piano

1

4/4

4/4

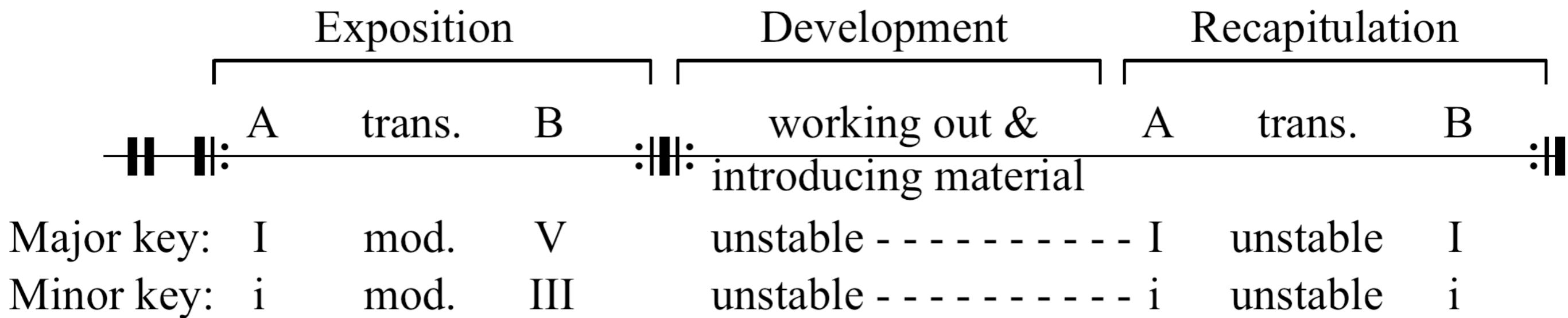
Marco Stroppo

le procès d'intention

An Angry Darkness



Marco Stroppa



POWER AND PROCESS

POWER AND PROCESS

"With great power comes great responsibility"

POWER AND PROCESS

"With great power comes great responsibility"

-Uncle Ben to Peter Parker

POWER AND PROCESS

"With great power comes great responsibility"

-Uncle Ben to Peter Parker

"It's not the destination, it's the journey."

POWER AND PROCESS

"With great power comes great responsibility"

-Uncle Ben to Peter Parker

"It's not the destination, it's the journey."

-Ralph Waldo Emerson

How I use computers

Crunching numbers (synthesis, randomisation)

Testing equations, running a process (especially iterative)

Analysis/resynthesis

Creating and controlling Space

What I look for when using a algorithm

Natural Process

Organic origin // organic unity

And then there is this...

Interactive/live systems

How I use computers

Crunching numbers (synthesis, randomisation)

Testing equations, running a process (especially iterative)

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Creating and controlling Space

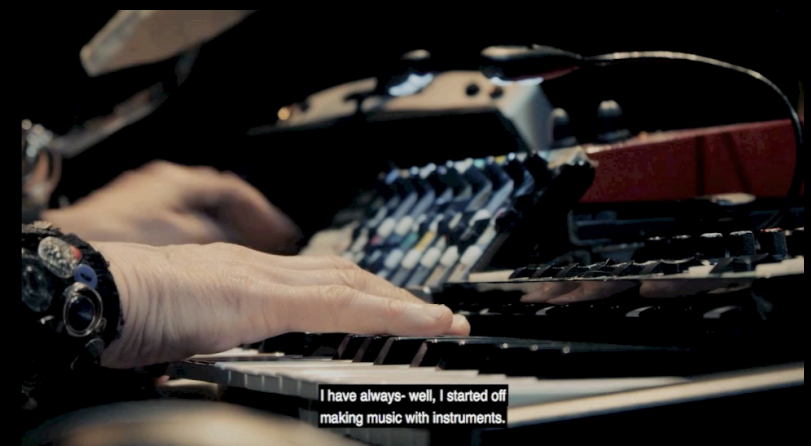
What I look for when using a algorithm

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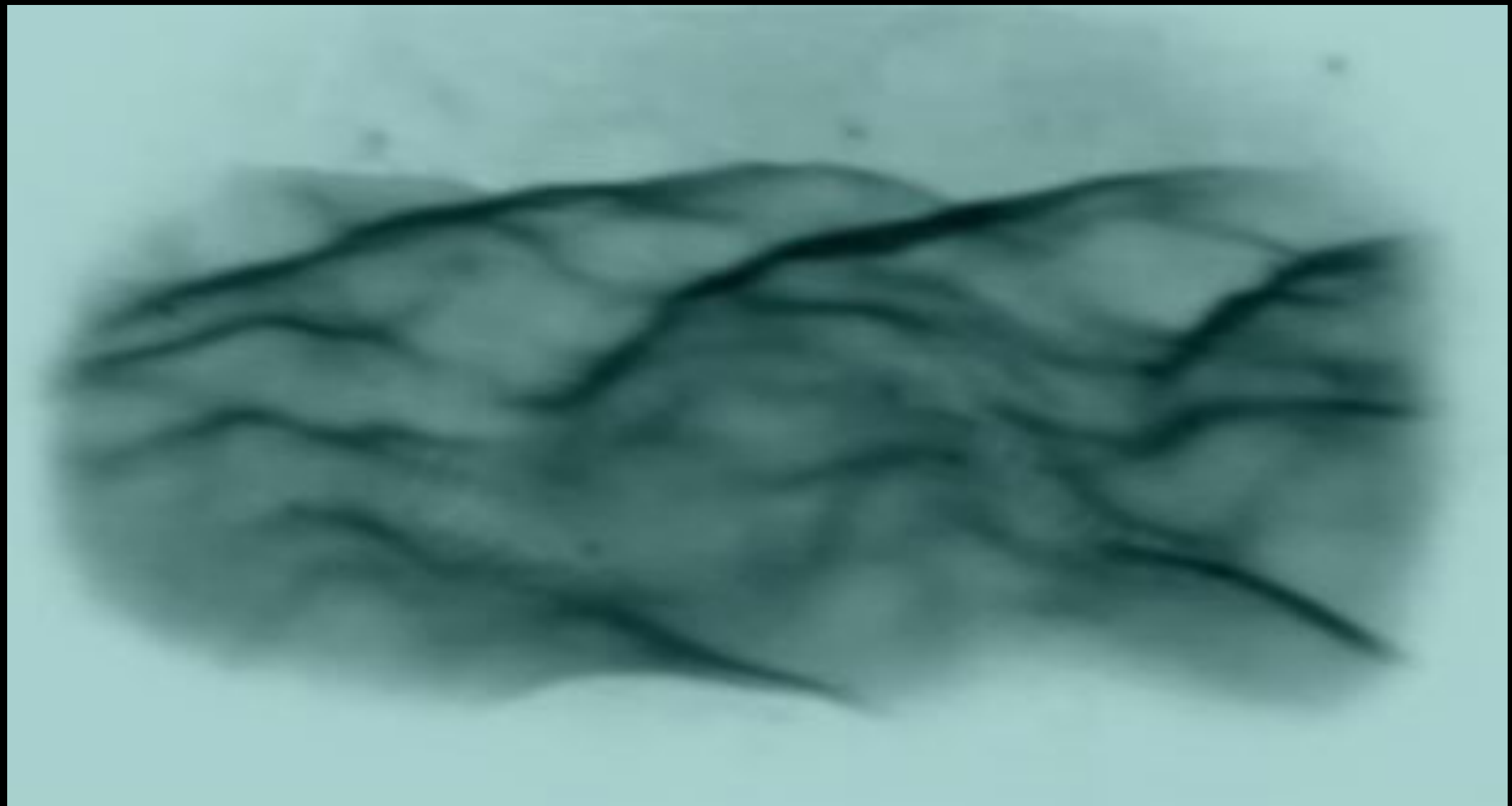
I have always- well, I started off making music with instruments.

And then there is this...

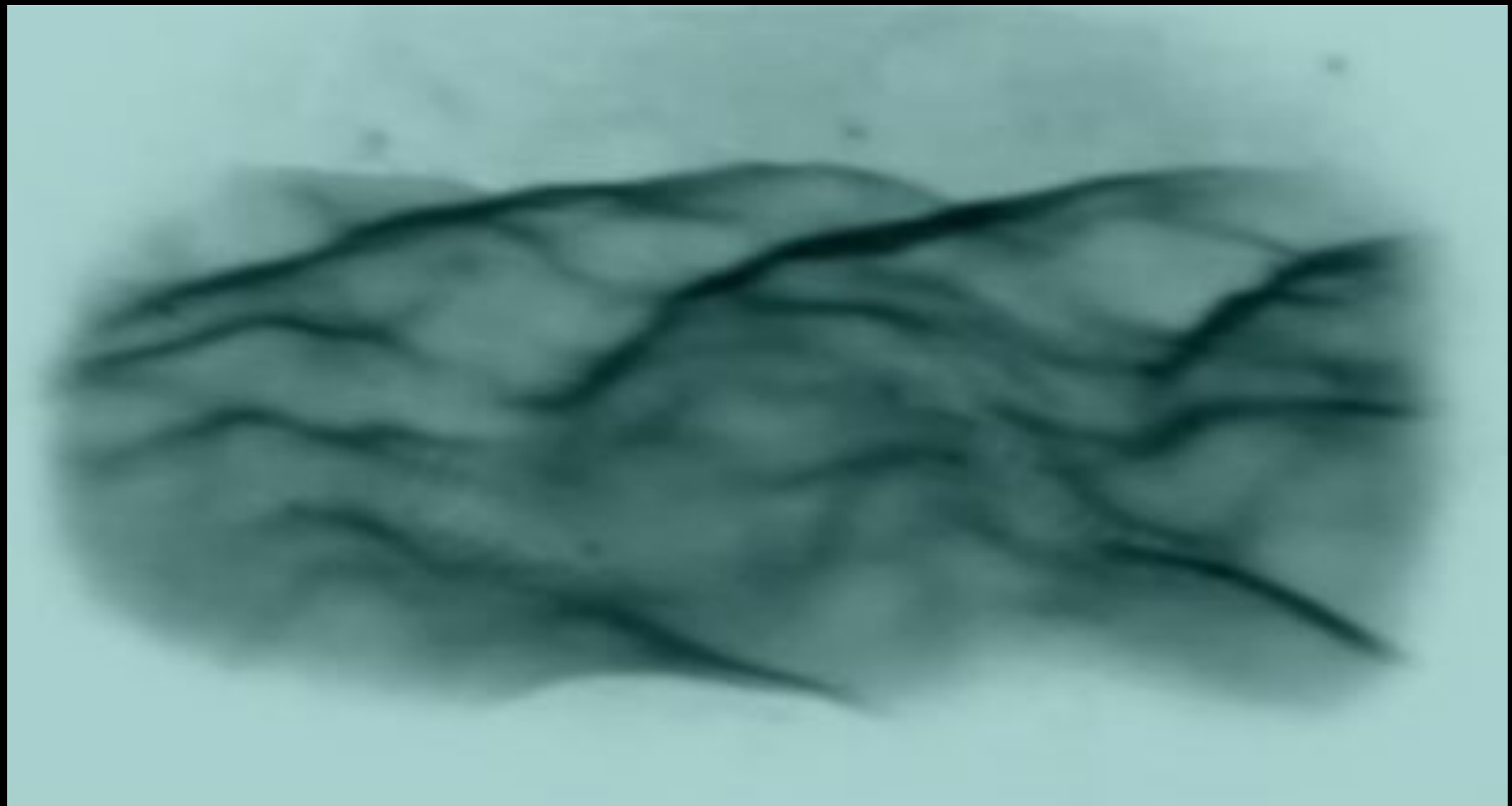
Interactive/live systems

Ripple effects

Ripple effects



Ripple effects



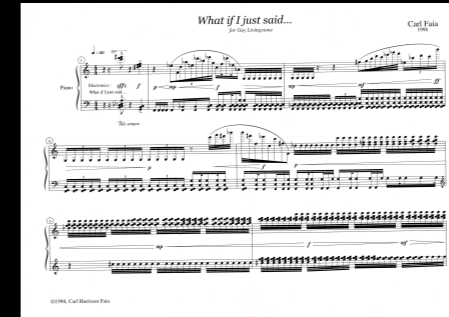
Drift



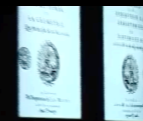
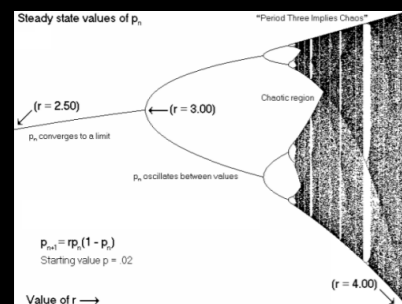
Lointains



What if I just said...



Certain chemin



WaveStudies

also Solo

DRIIFT

Carl FAIA

? spiccato? violento

Violin

Violoncello

Violoncello

Violoncello

Violoncello

Violoncello

Violoncello

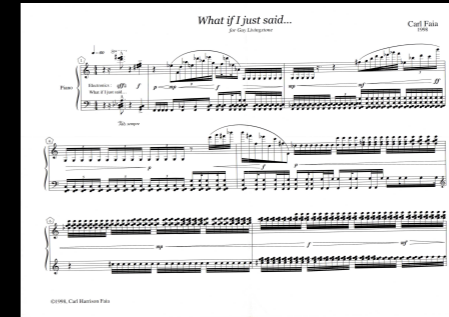
Violoncello

Drift

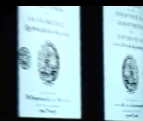
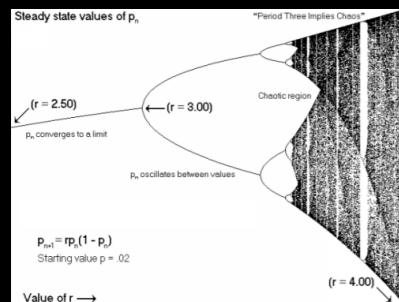
Lointains



What if I just said...



Certain chemin



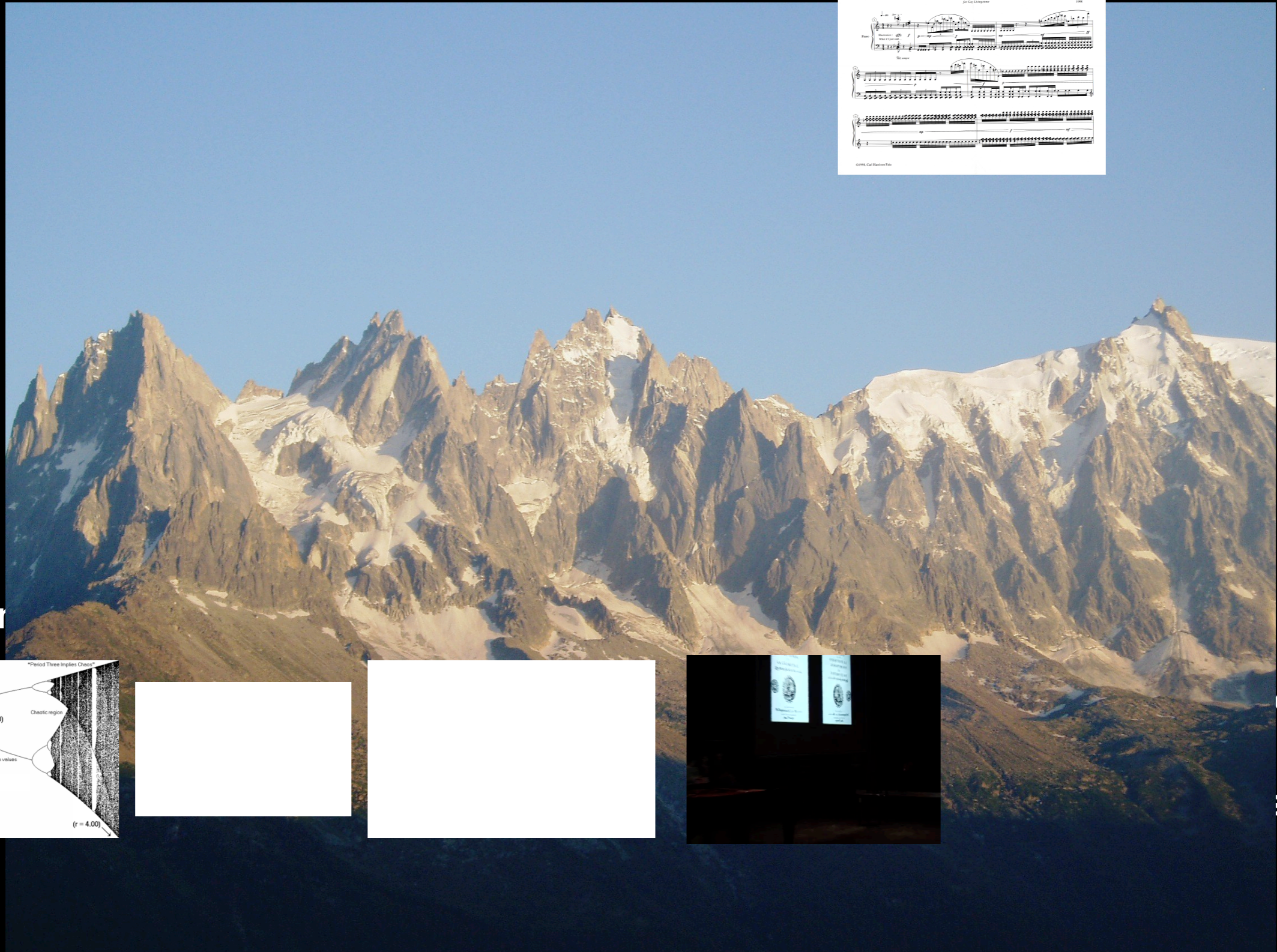
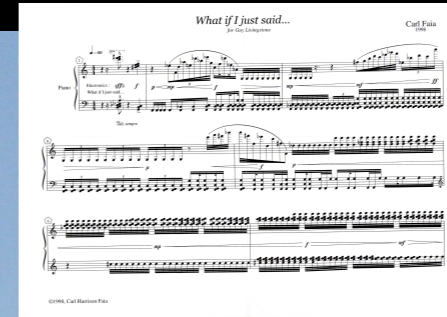
WaveStudies

also Solo

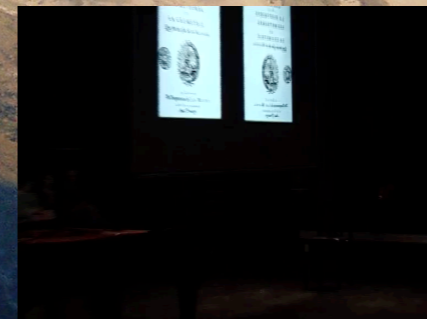
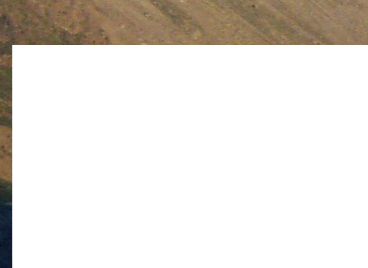
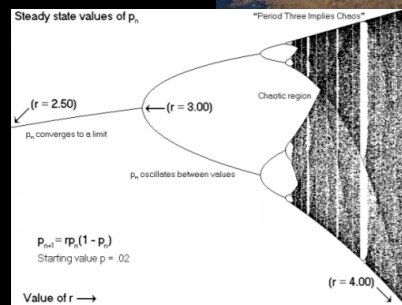
Drift

Lointains

What if I just said...



Certain



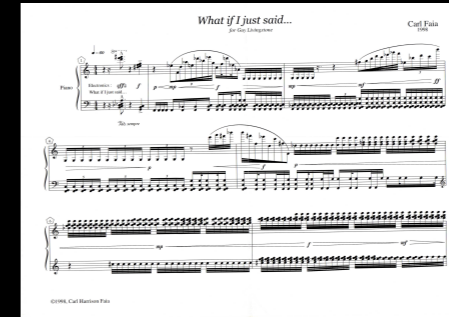
eStudies

so Solo

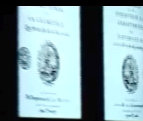
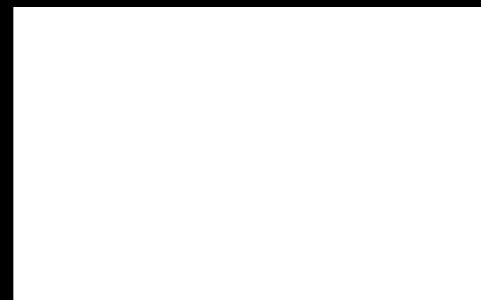
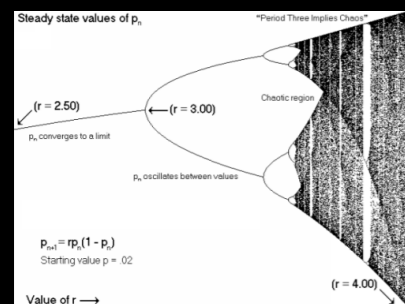
Drift

Lointains

What if I just said...



Certain chemin



WaveStudies

also Solo

What if I just said...

for Guy Livingstone

Carl Faia
1998

♩ = 60 8^{va}

Piano

Electronics: *sfz* *f*

What if I just said...

p *mp* *f* *mp* *mf* *ff*

red. sempre

The first system of the musical score is in 4/4 time with a tempo of 60. It features a piano part with a treble and bass clef. The treble clef has a first ending bracketed with a circled '1'. The bass clef has a '9' marking above a group of notes. Dynamics range from piano (p) to fortissimo (ff). The piece is marked 'red. sempre'.

4

p *f* *p*

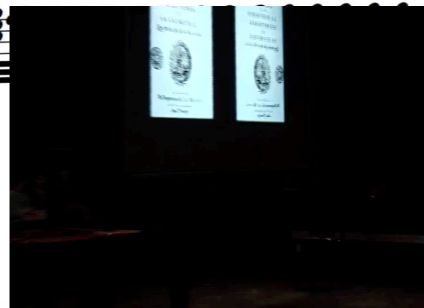
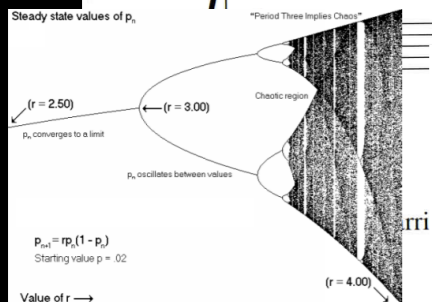
The second system continues the piano part. It features a treble clef with a first ending bracketed with a circled '4'. The bass clef has a '5' marking above a group of notes. Dynamics range from piano (p) to fortissimo (f) and back to piano (p).

6

mp *f* *mf*

The third system continues the piano part. It features a treble clef with a first ending bracketed with a circled '6'. The bass clef has a '5' marking above a group of notes. Dynamics range from mezzo-piano (mp) to fortissimo (f) and mezzo-forte (mf).

Ce



veStudies

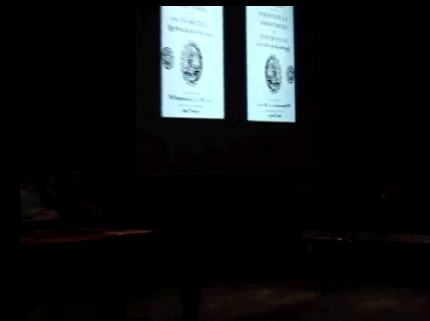
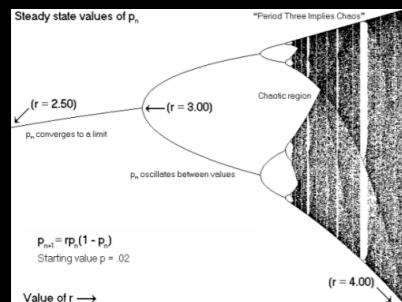
Iso Solo

Drift

Lointains

What if I just said...

Certain chemin

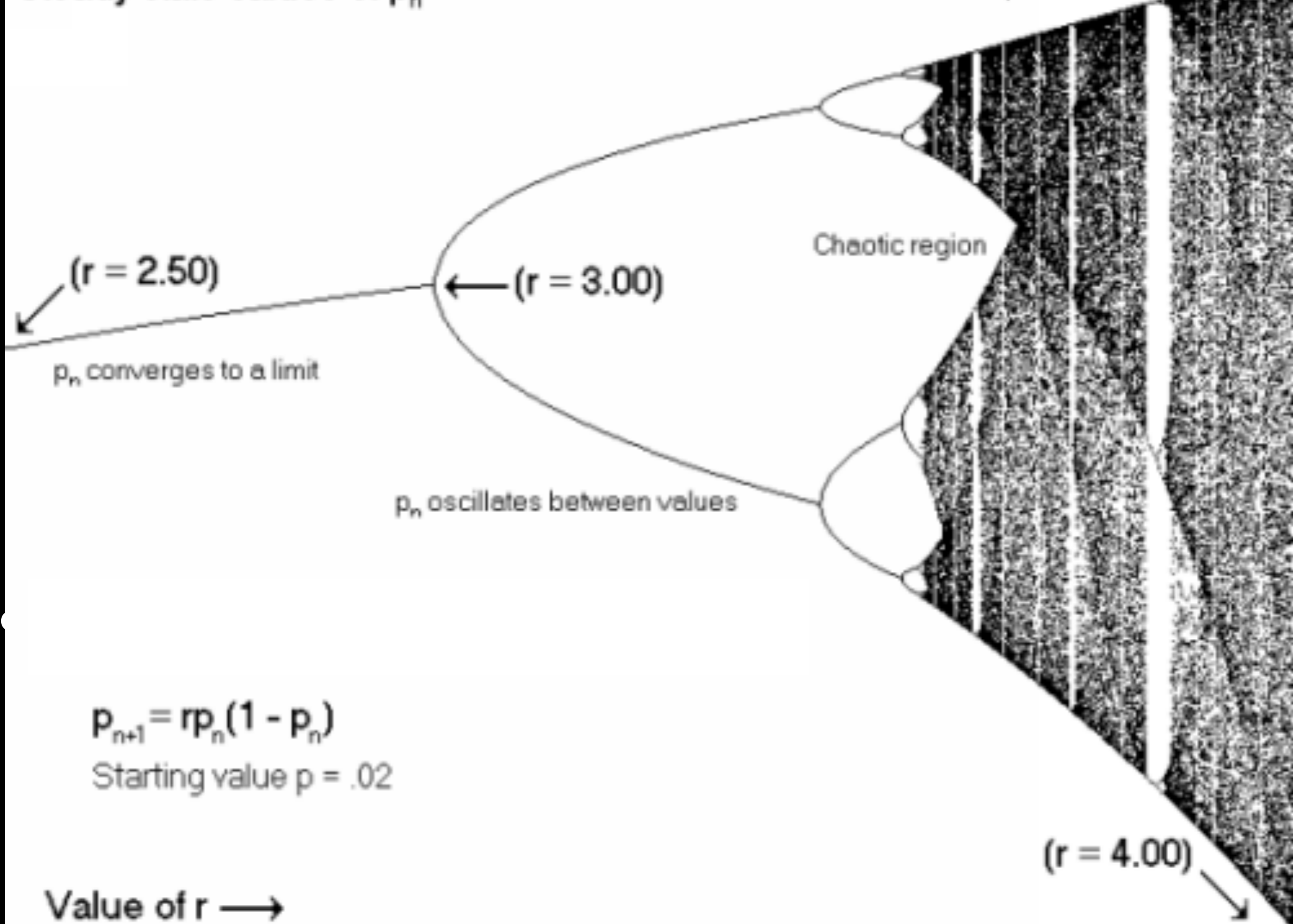


WaveStudies

also Solo

Steady state values of p_n

"Period Three Implies Chaos"



C

Studies

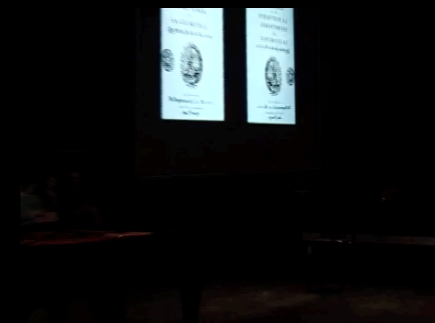
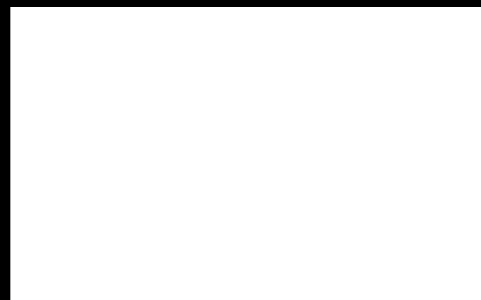
o Solo

Drift

Lointains

What if I just said...

Certain chemin



WaveStudies

also Solo

Drift

Lointains

What if I just said...

o

udies

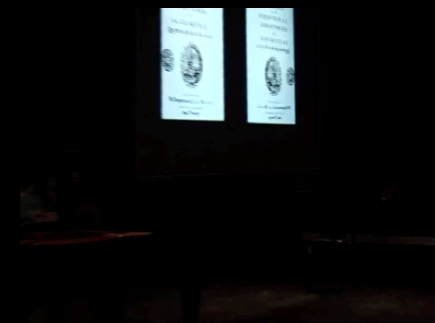
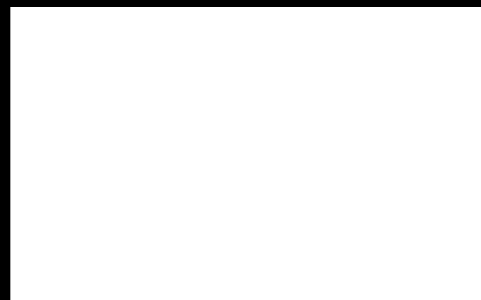
olo

Drift

Lointains

What if I just said...

Certain chemin



WaveStudies

also Solo

Drift

Leintei

What if I just said

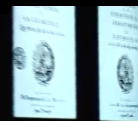
es

Drift

Lointains

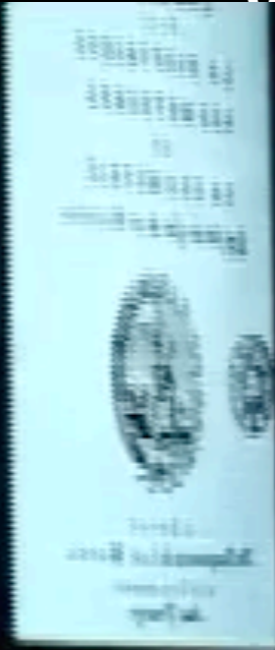
What if I just said...

Certain chemin



WaveStudies

also Solo



Studies

Solo

Drift

Lointains

What if I just said...

Certain chemin

WaveStudies

also *Solo*

WavesStudies 2

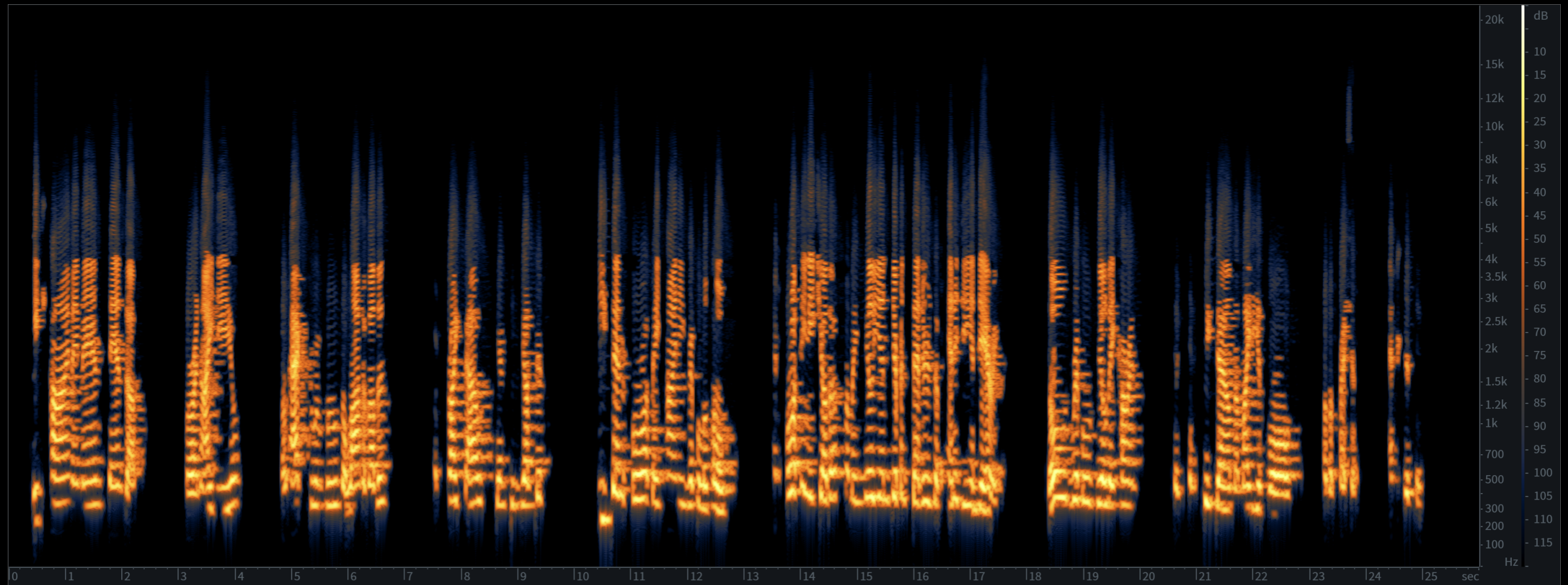
Ripples

WavesStudies 2

Ripples

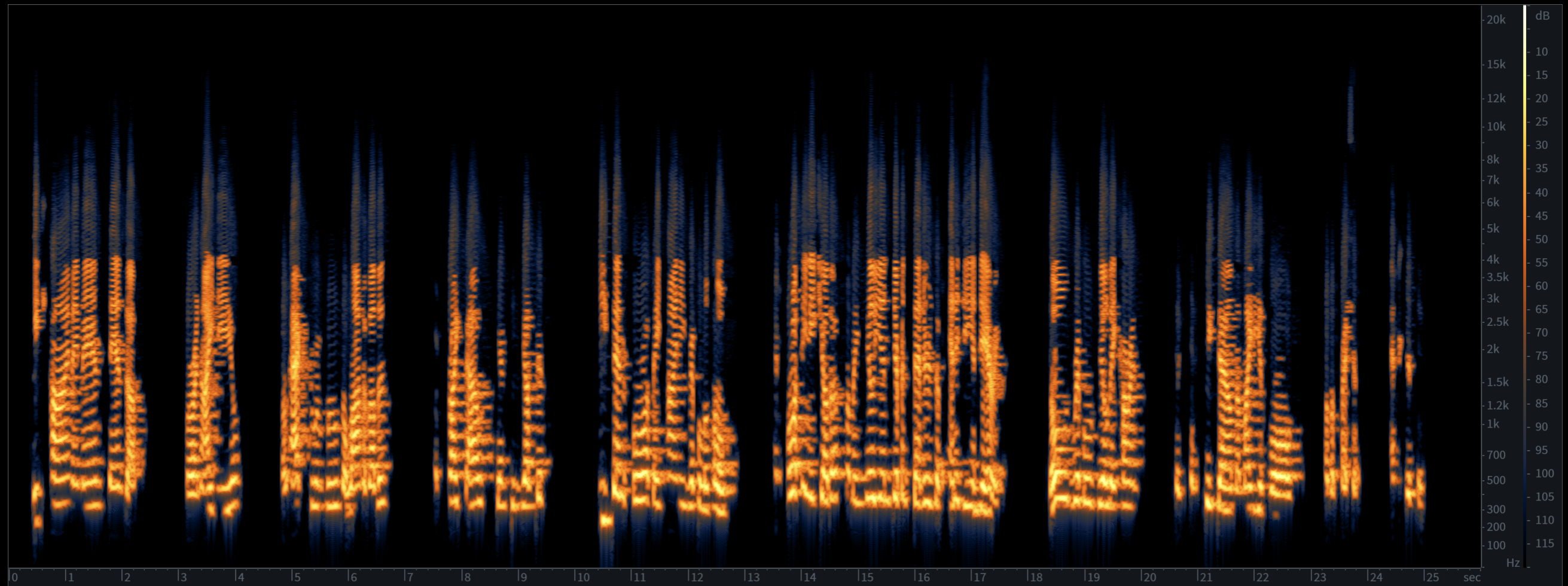
WavesStudies 2

Ripples



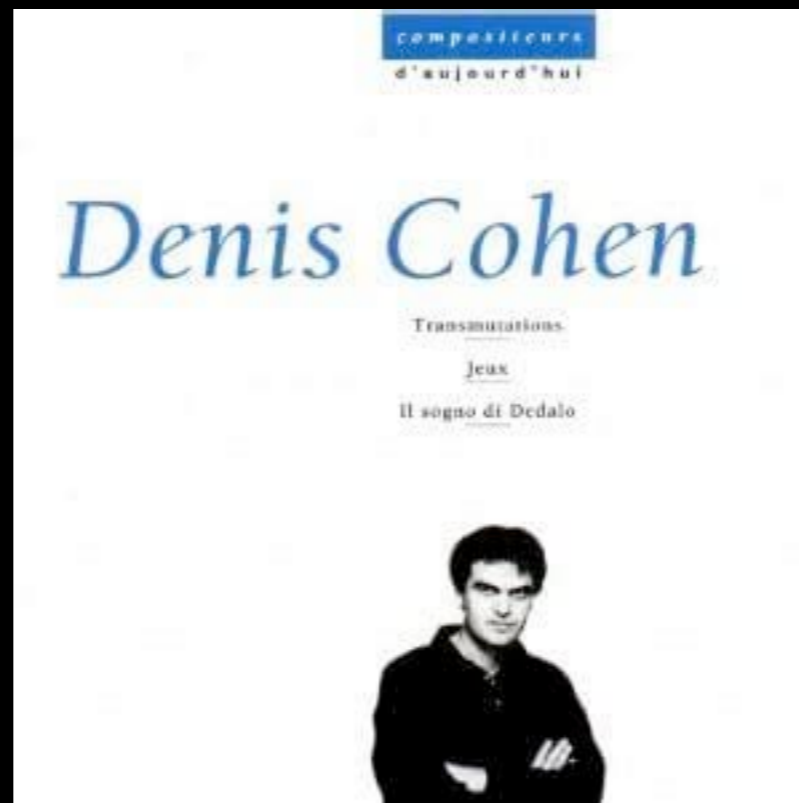
WavesStudies 2

Ripples



Each time a man stands up for an ideal, or acts to improve the lot of others, or strikes out against injustice, he sends forth a tiny ripple of hope, and crossing each other from a million different centers of energy and daring those ripples build a current which can sweep down the mightiest walls of oppression and resistance.

Robert F. Kennedy Speeches / University of Cape Town





Audio analysis, systems design, improv, etc.

Morphing! learning



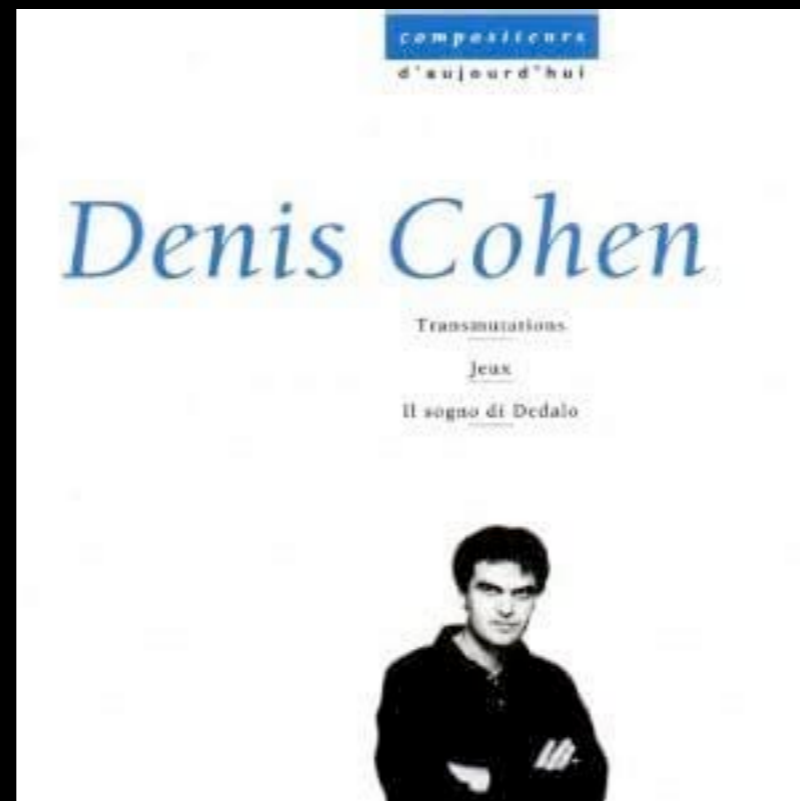
Audio analysis, harmonic extraction, massive morphing



Audio analysis, systems design, chaos, juggling, etc.



Un coup de des, morphing, ...psy



Bird song, alphorn, morphing & MIDI cowbells



Audio analysis, systems design, improv, etc.

Morphing! learning



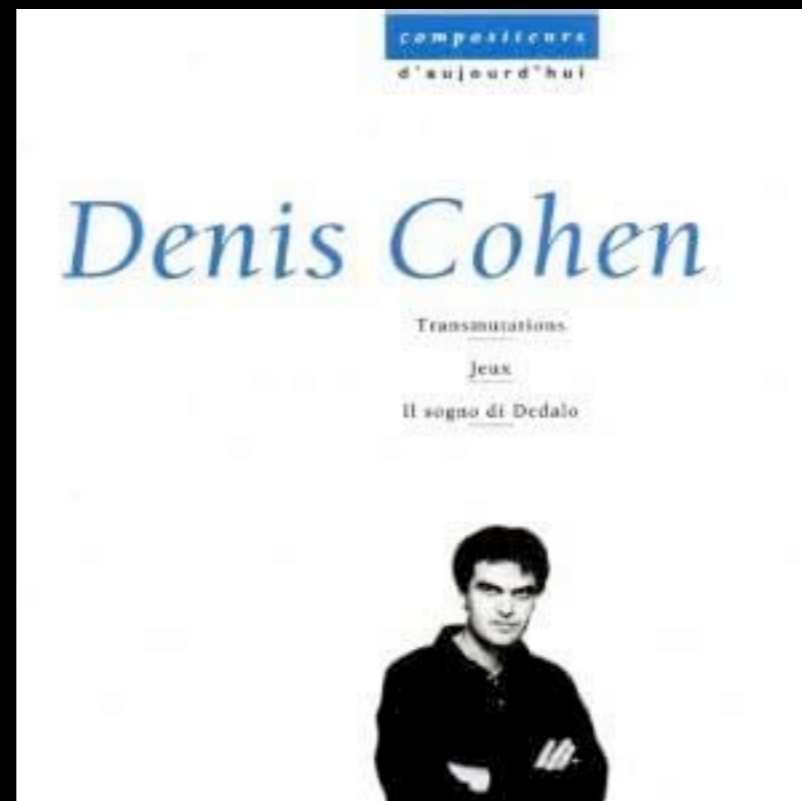
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Un coup de des, morphing, ...psy



SPACE



Bird song, alphorn, morphing & MIDI cowbells

DIPHONE

REPMUS

SPACE

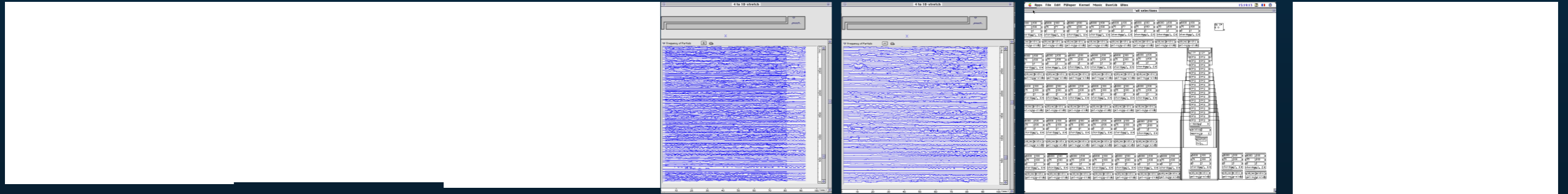
INTERACTIVE

Leroux

Final

Working on it...

secret



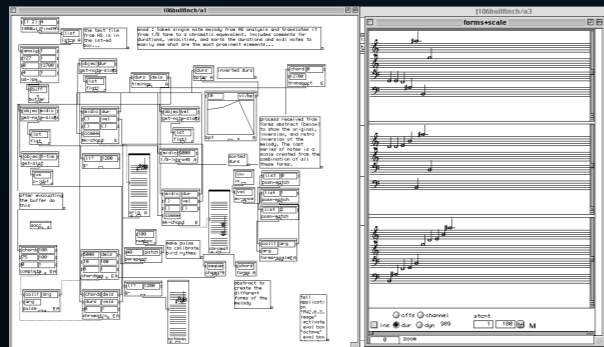
Wood

Analysis - Data

Morphing

Ambisonics

Tweet



AH->Shak

Bell-AH



DIPHONE

REPMUS

SPACE

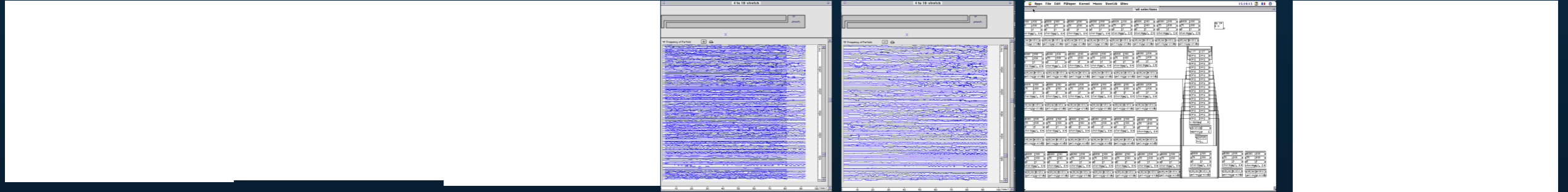
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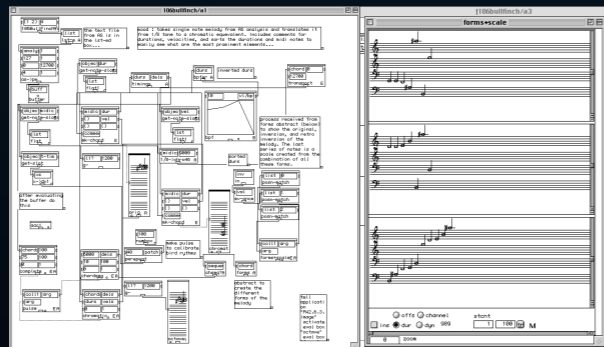
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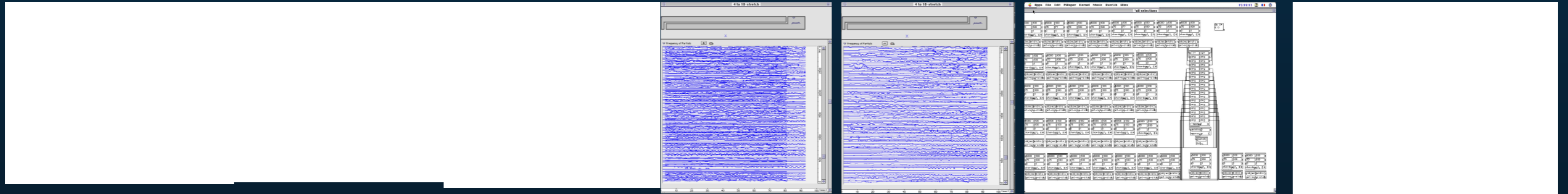
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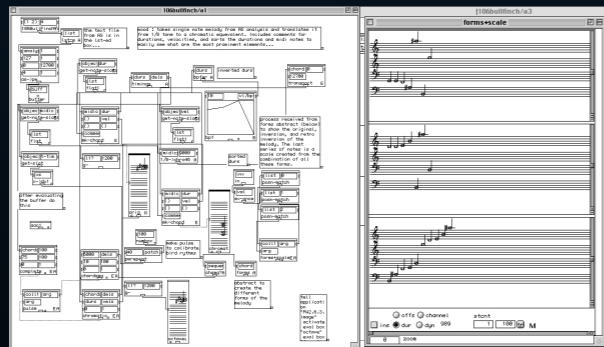
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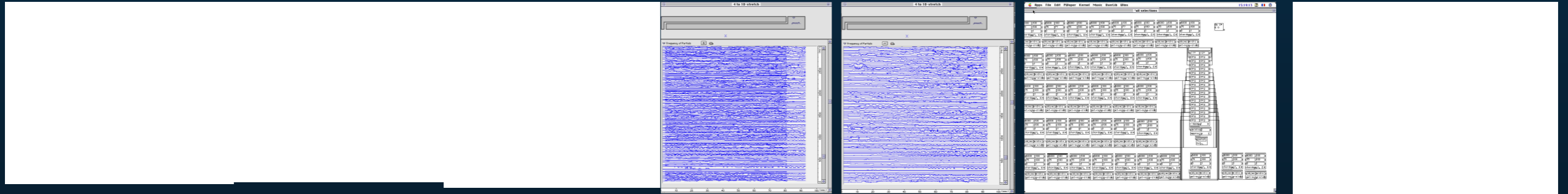
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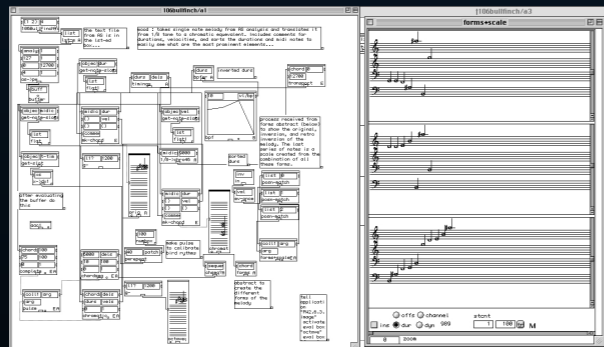
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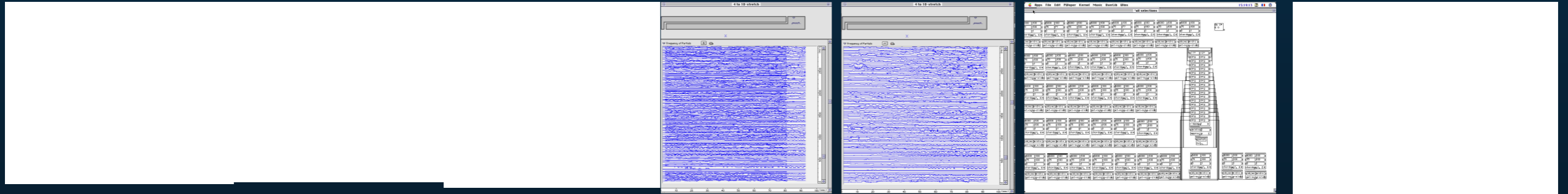
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secret



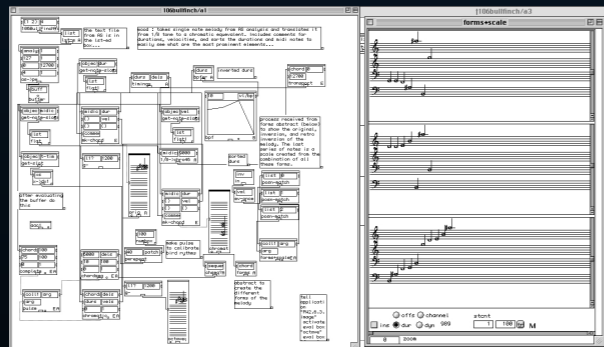
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Bell-AH



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REPMUS

SPACE

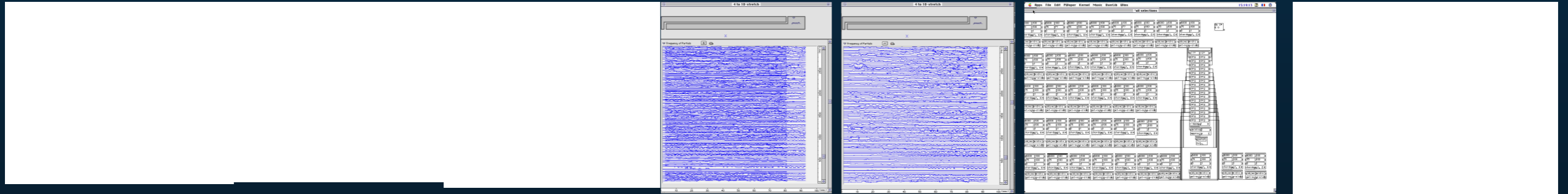
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secret



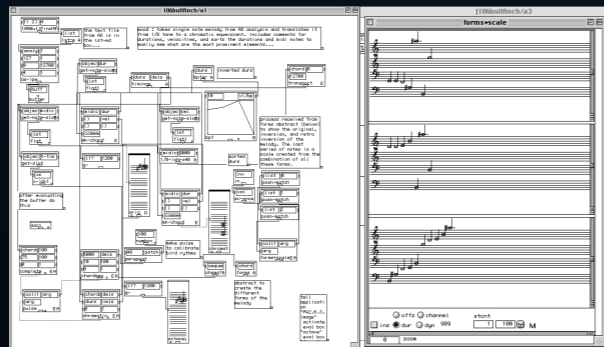
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Bell-AH



DIPHONE

REPMUS

SPACE

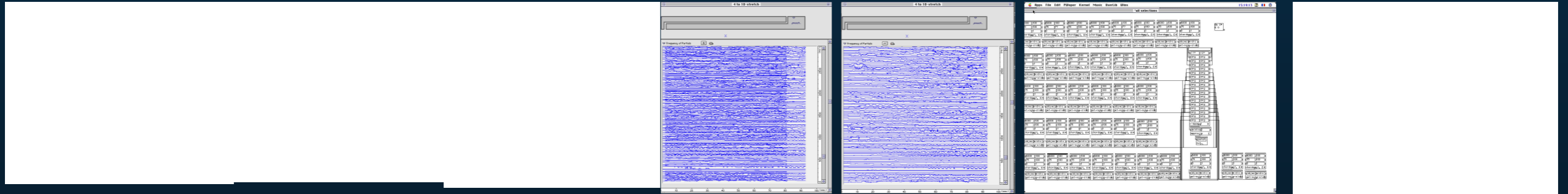
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Leroux

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Working on it...

secret



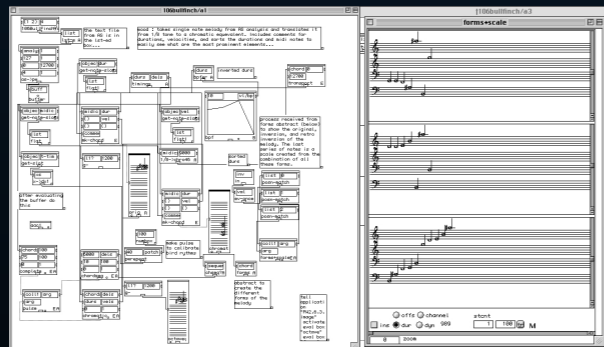
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Analysis - Data

Morphing

Ambisonics

Tweet



AH->Shak

Bell-AH



DIPHONE

REPMUS

SPACE

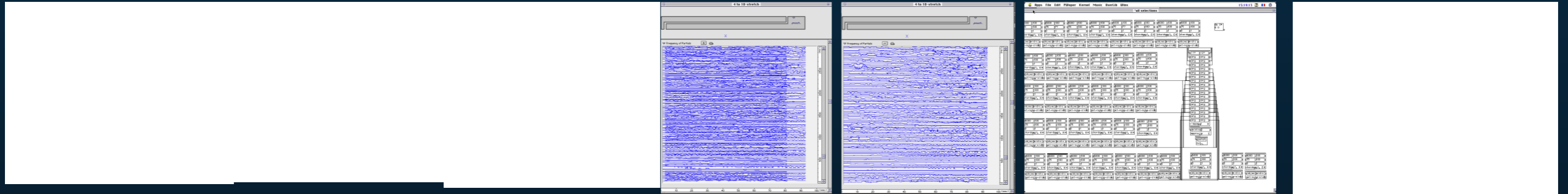
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secret



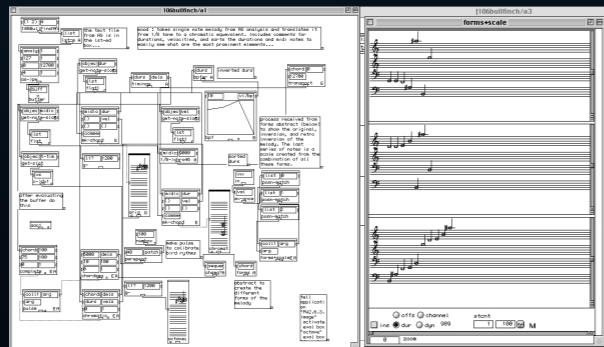
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AH->Shak

Bell-AH



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REPMUS

SPACE

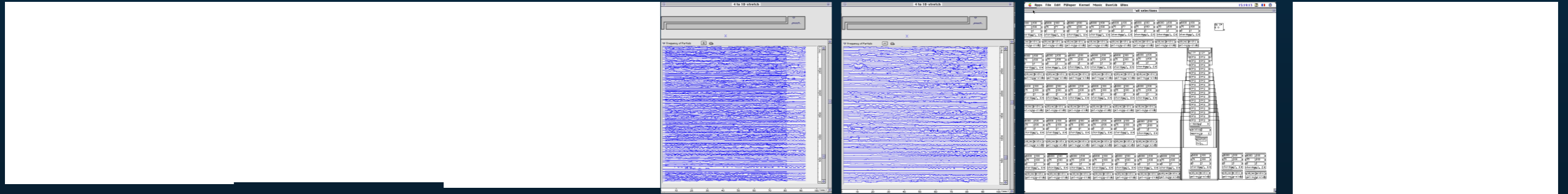
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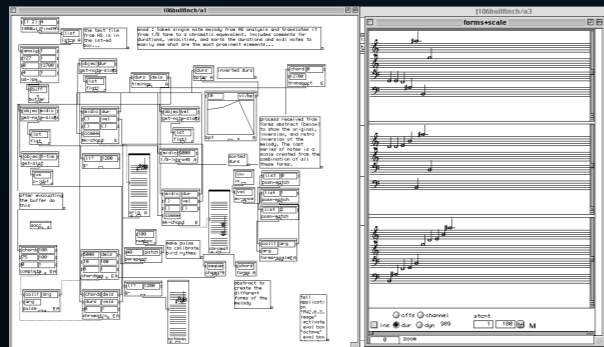
Wood

Analysis - Data

Morphing

Ambisonics

Tweet



AH->Shak

Bell-AH



DIPHONE

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DIPHONE

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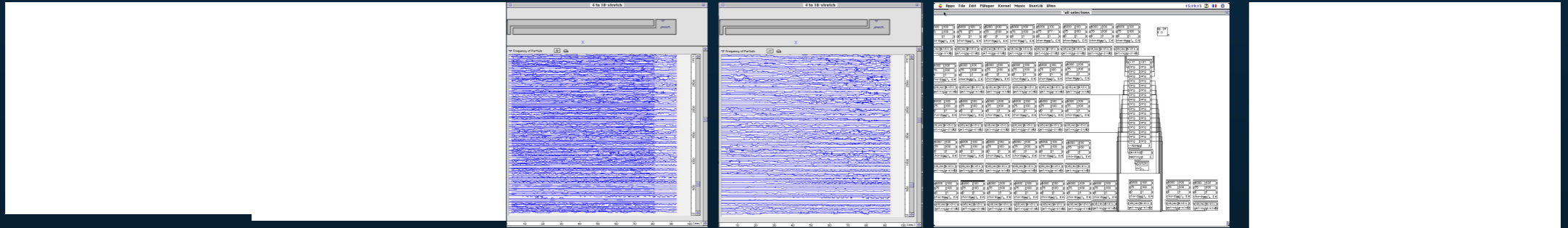
INTERACTIVE

Leroux

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secret



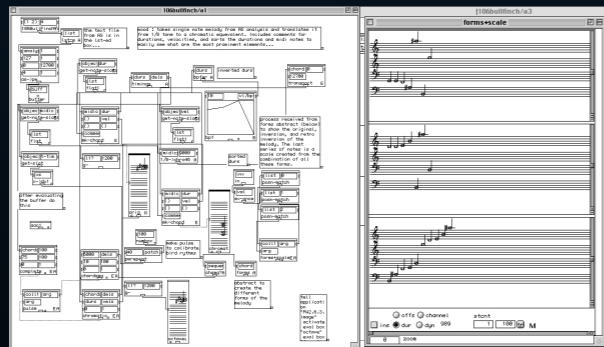
Wood

Analysis - Data

Morphing

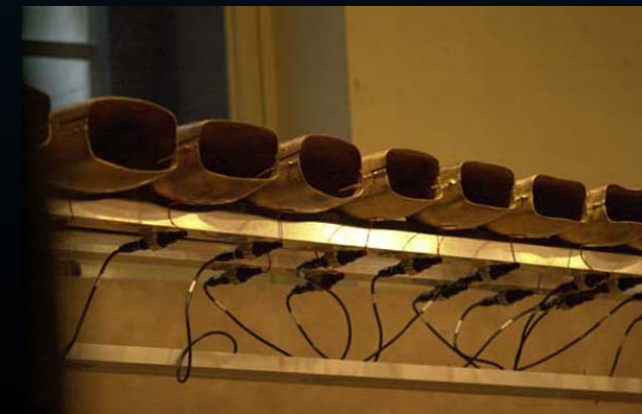
Ambisonics

Tweet



AH->Shak

Bell-AH



DIPHONE

REPMUS

SPACE

INTERACTIVE

Lero

secret

W

Tw



DIPHONE

REPMUS

SPACE

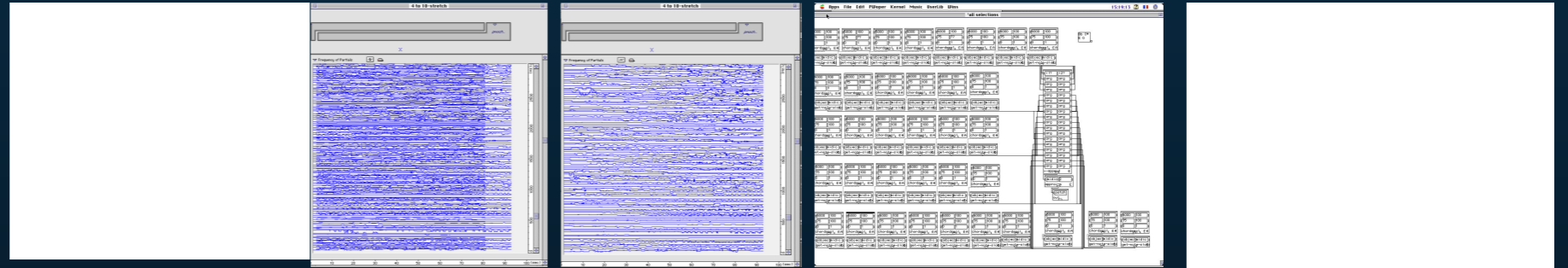
INTERACTIVE

Leroux

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Working on it...

secret



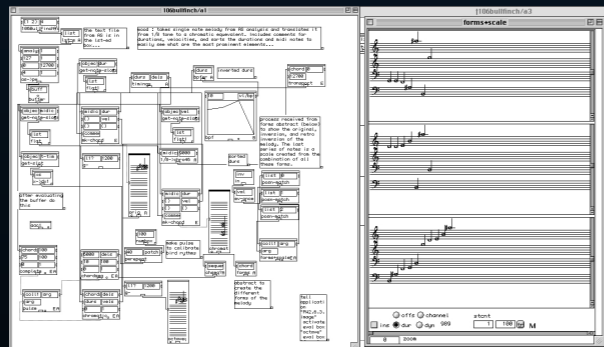
Wood

Analysis - Data

Morphing

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AH->Shak

Bell-AH



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DIPHONE

REPMUS

SPACE

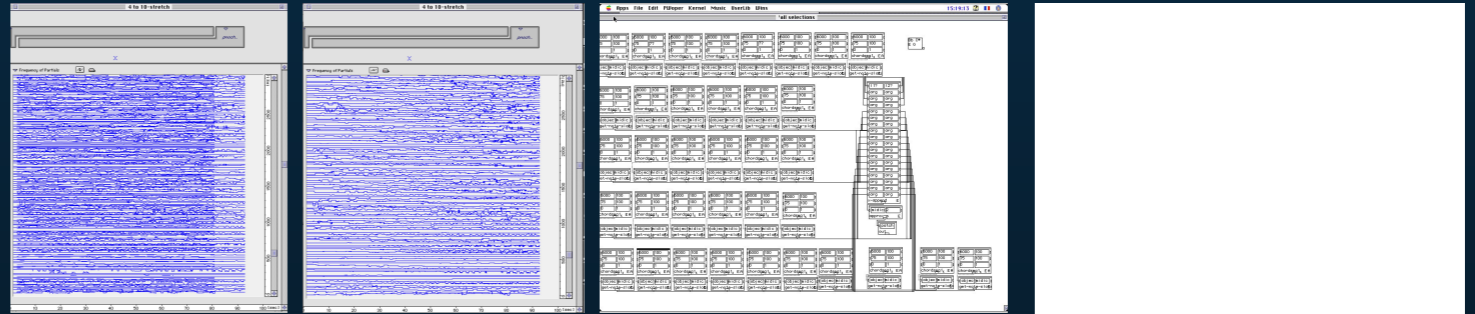
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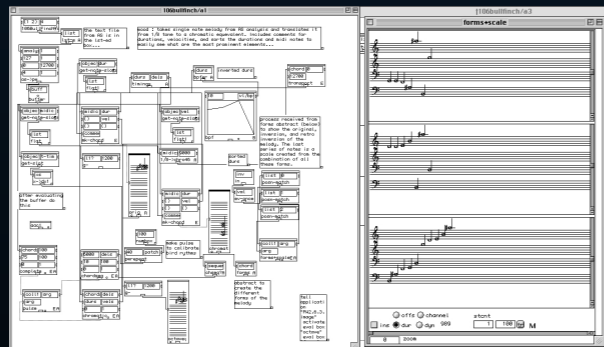
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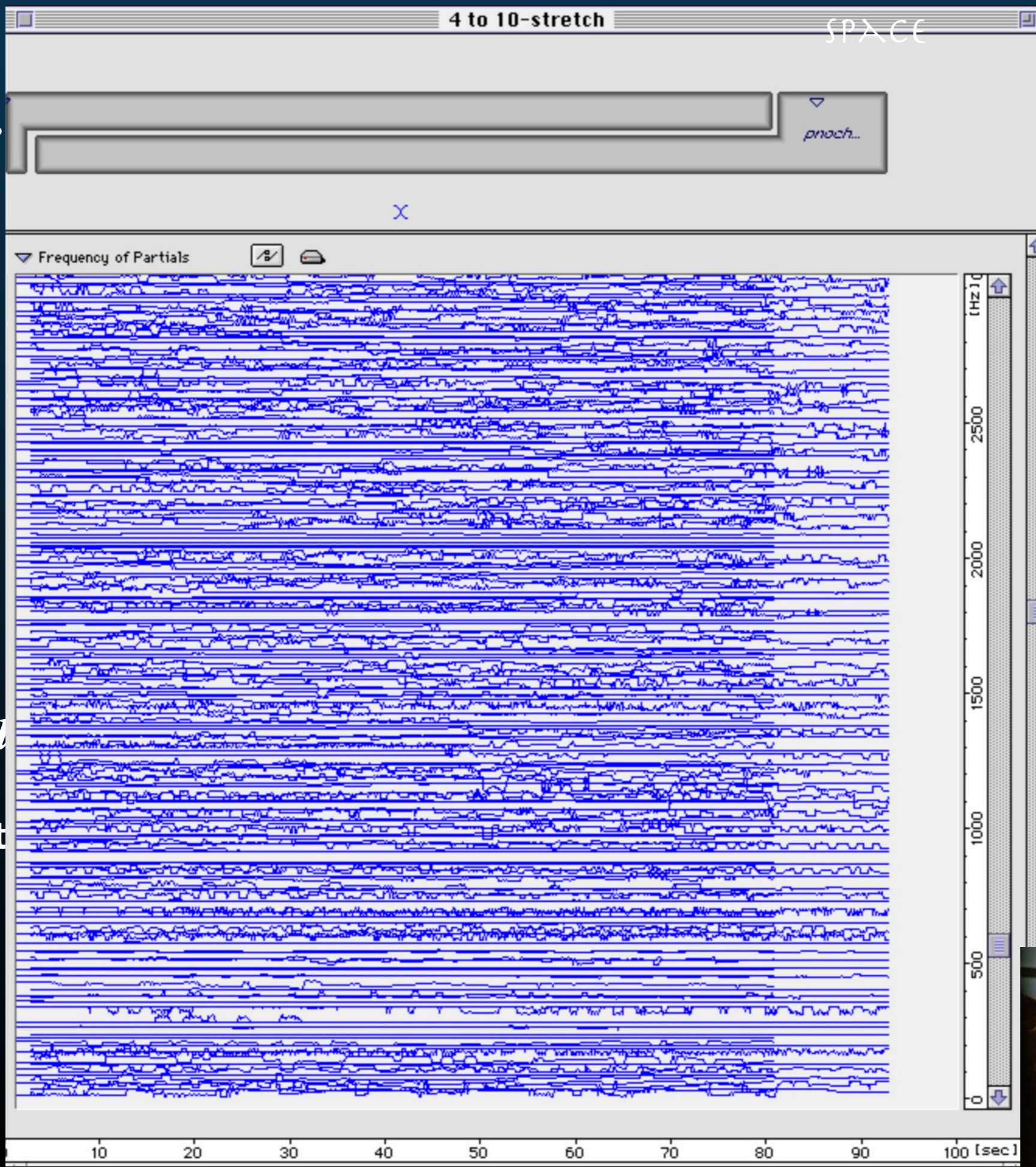


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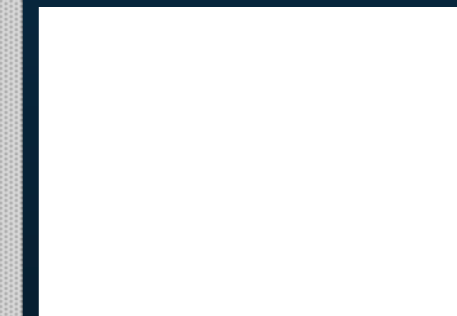


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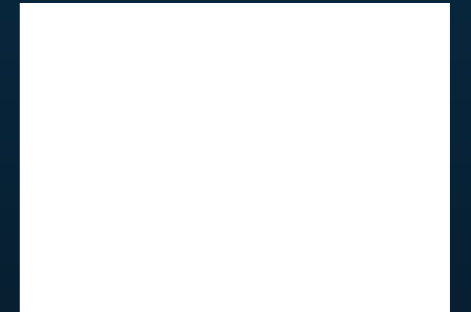
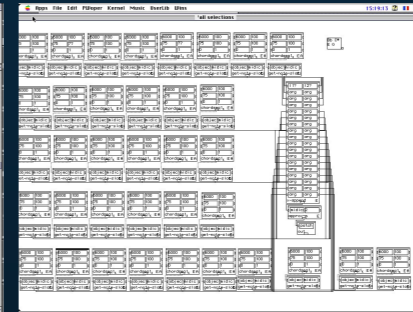
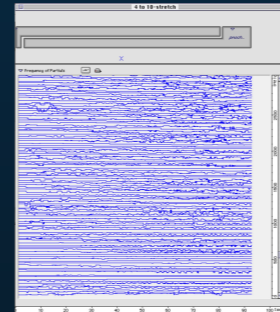
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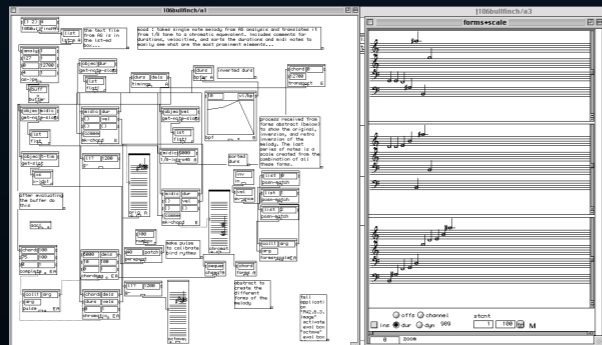
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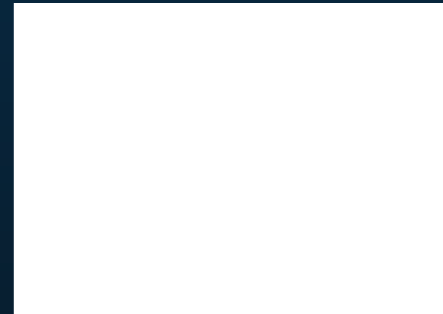
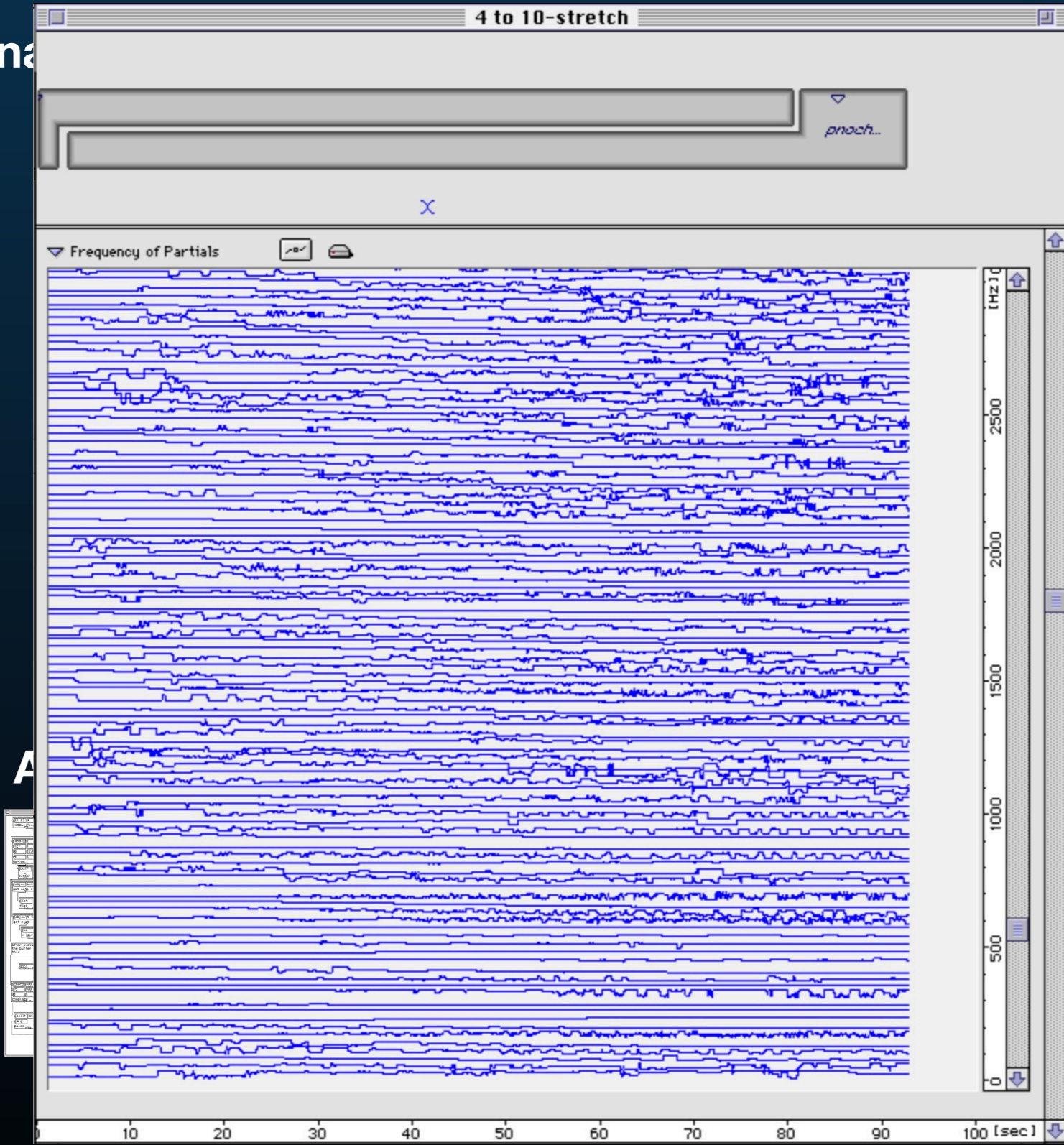
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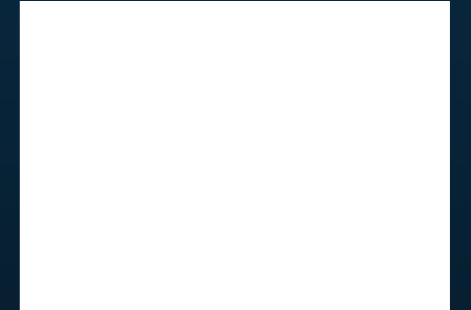
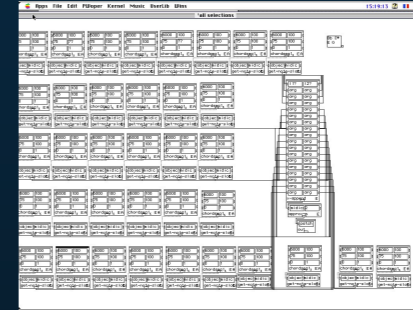
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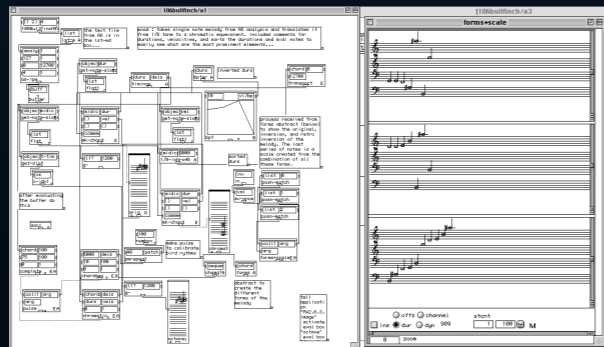
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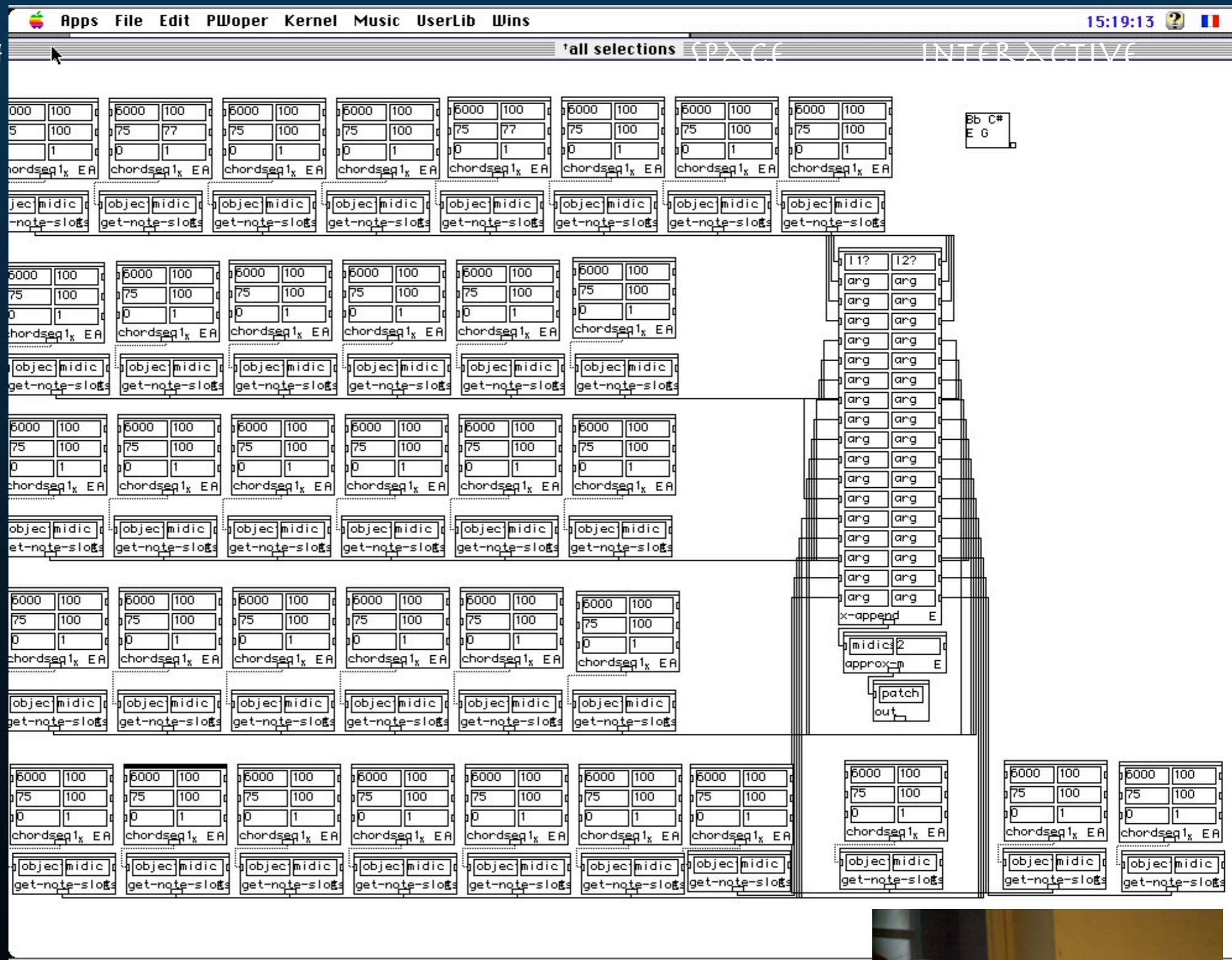


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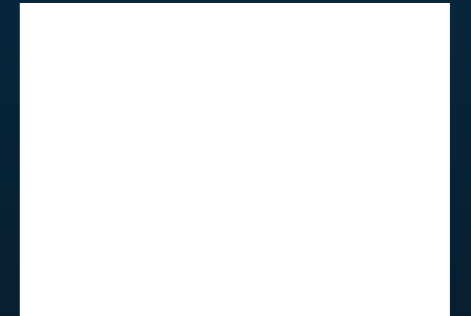
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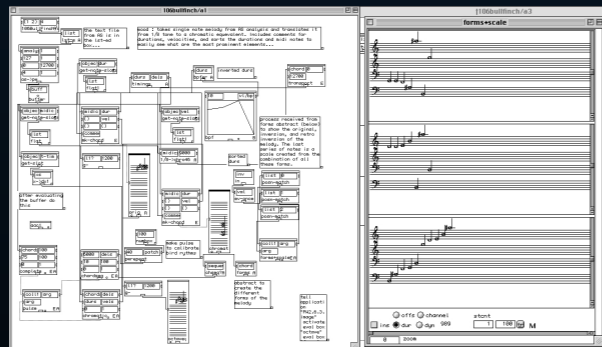
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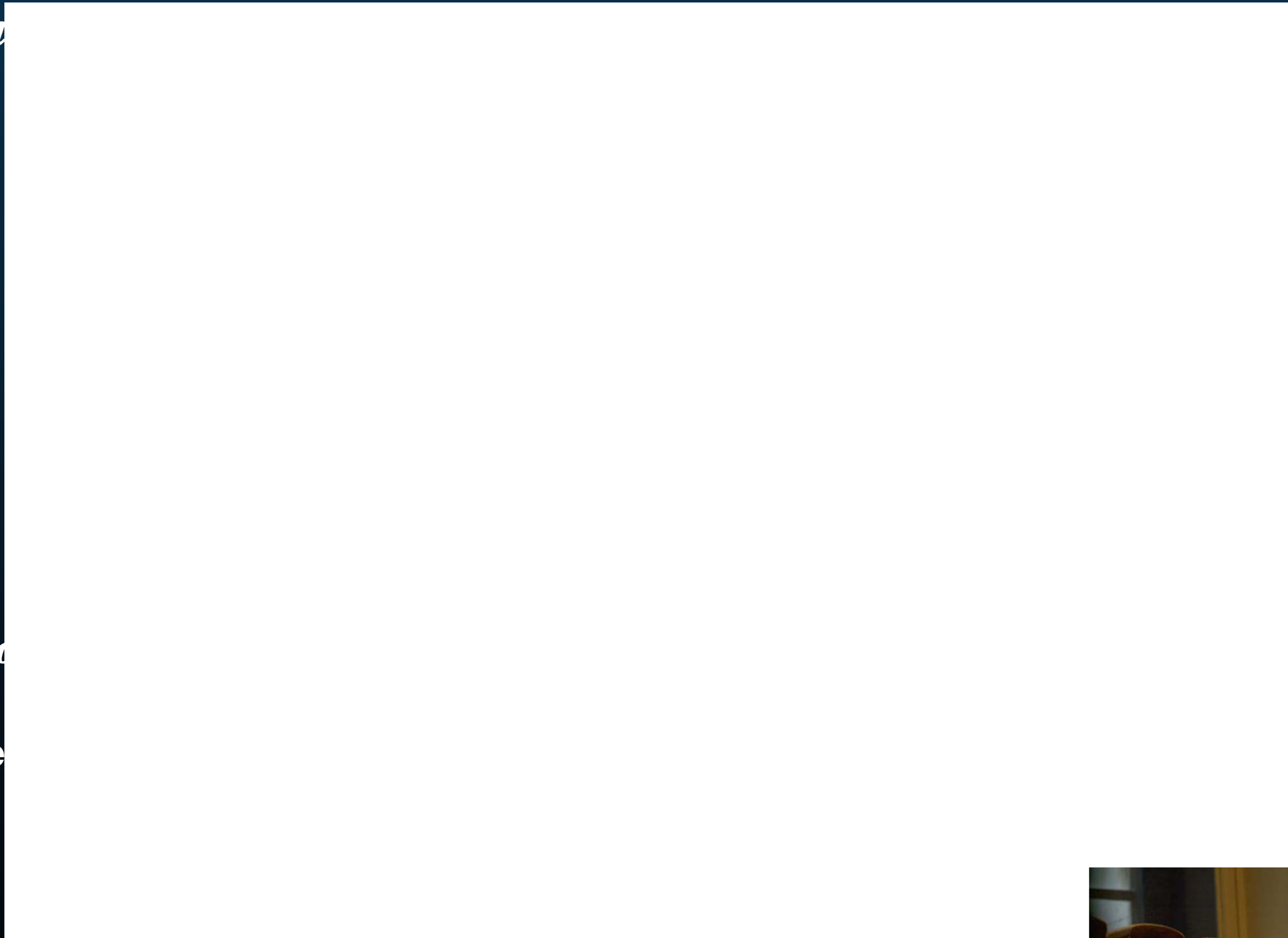
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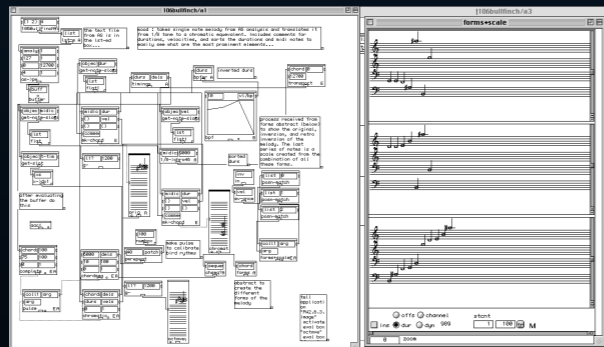
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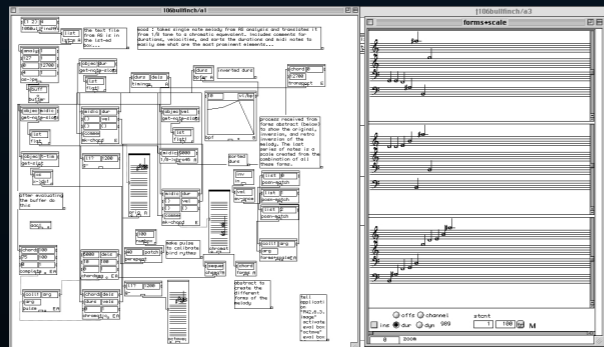
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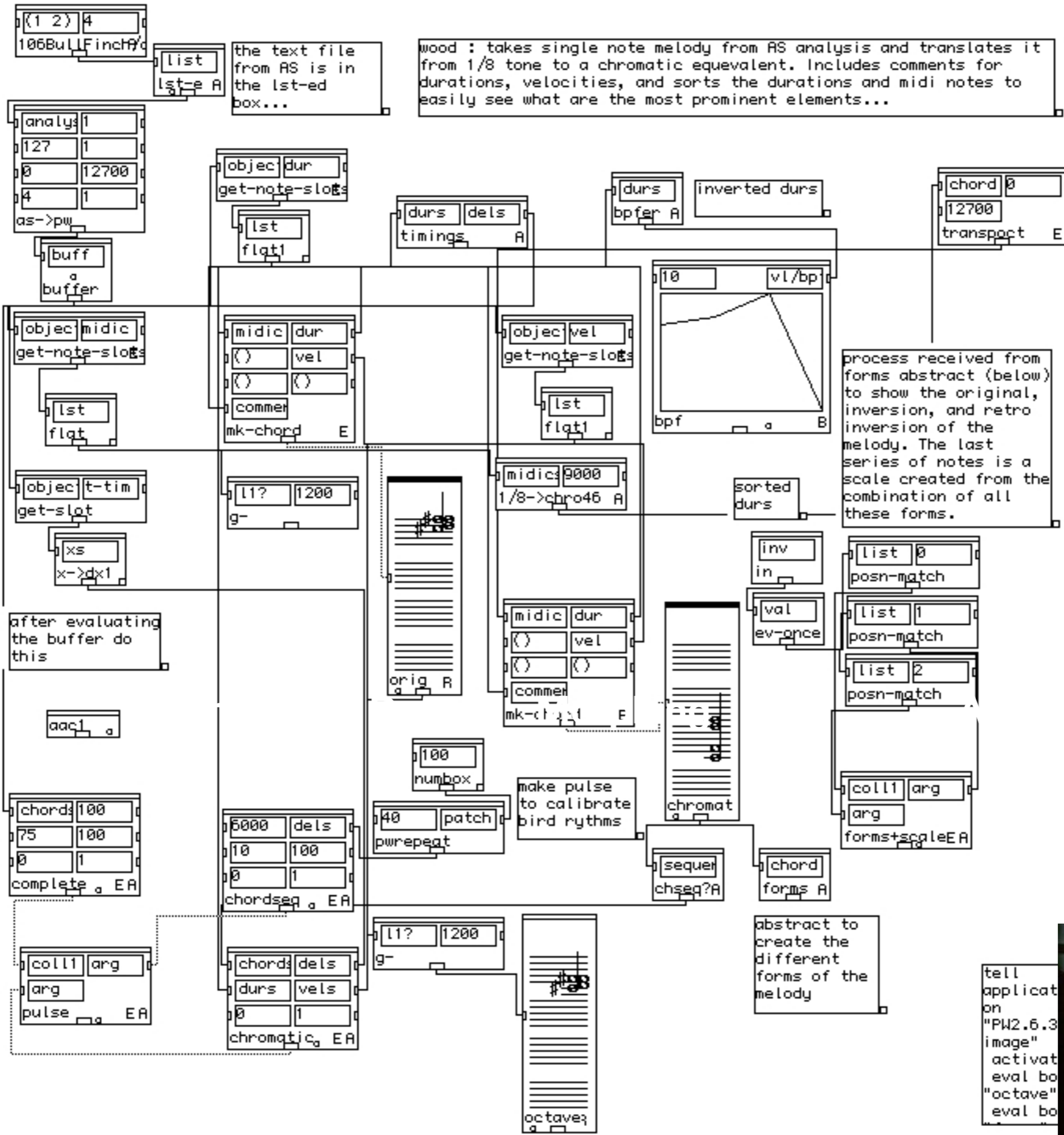
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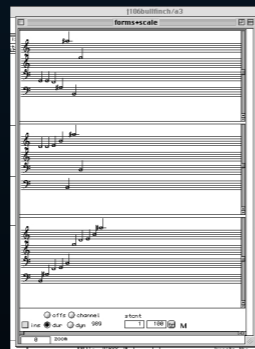
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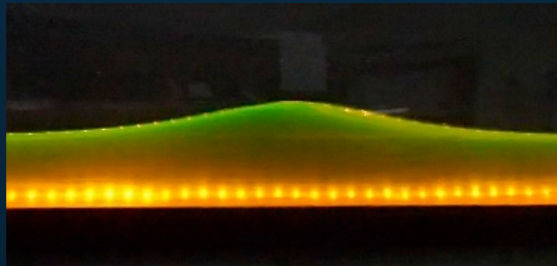
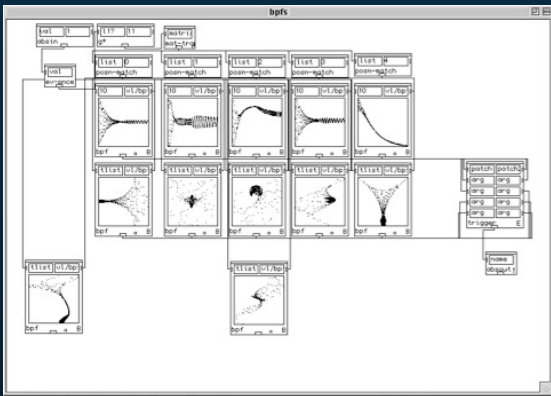
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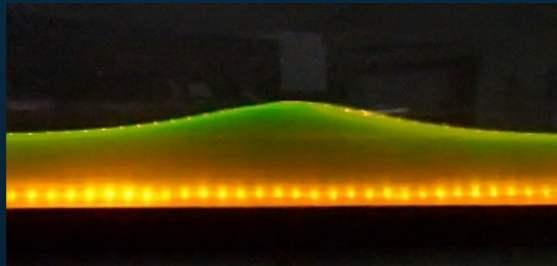
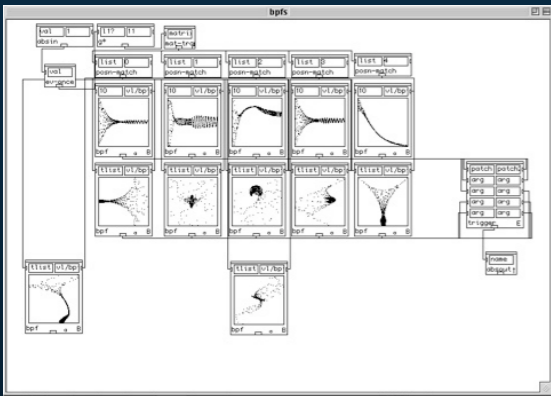
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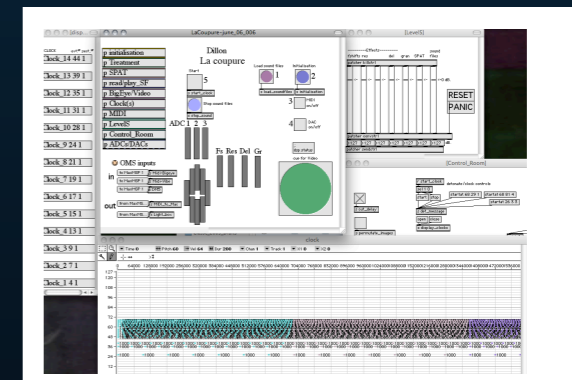


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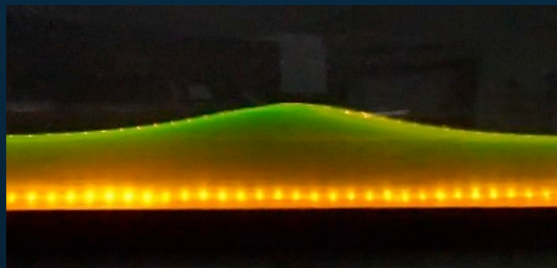
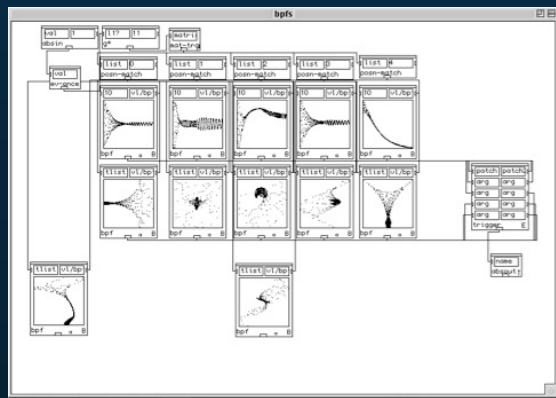
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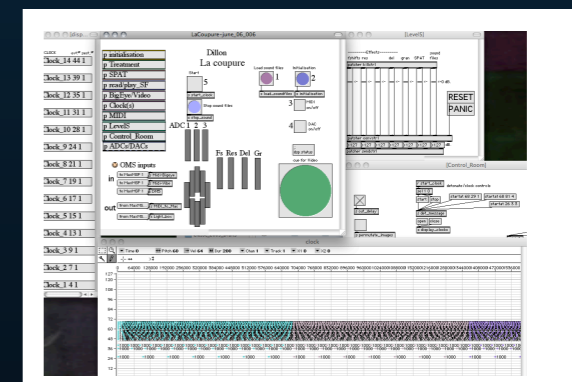


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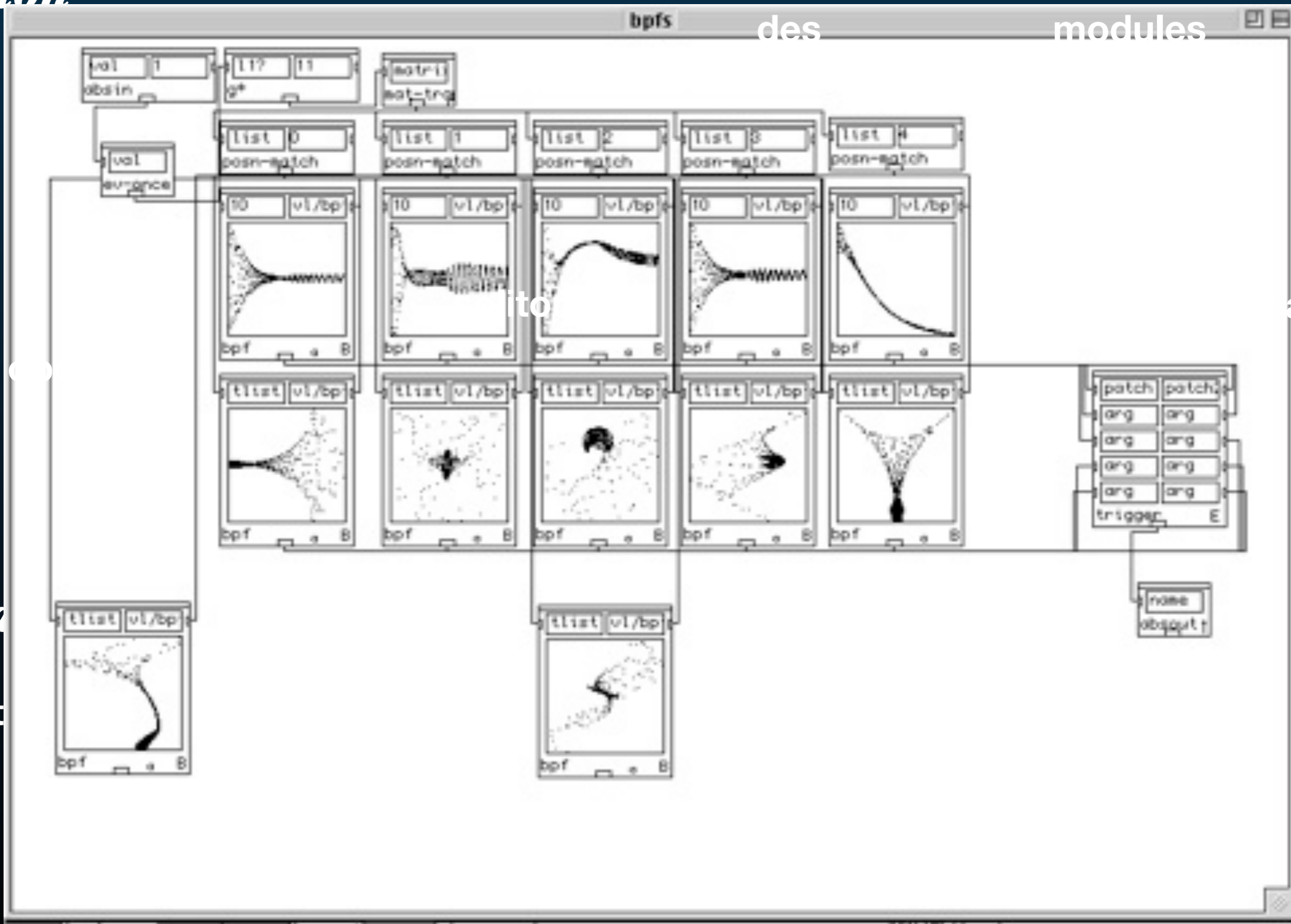
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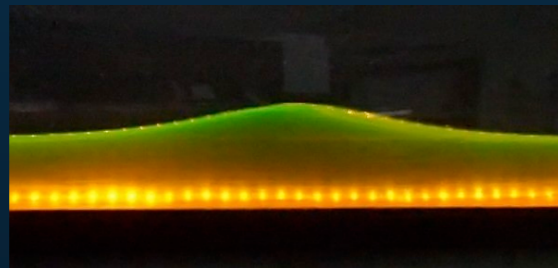
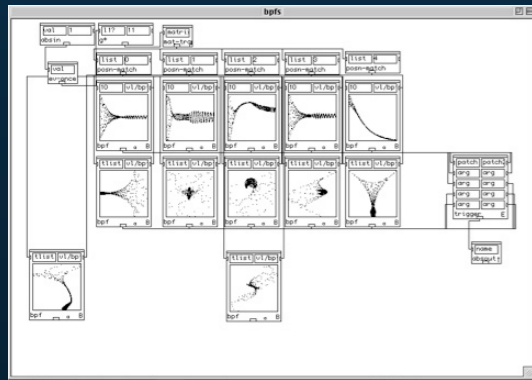
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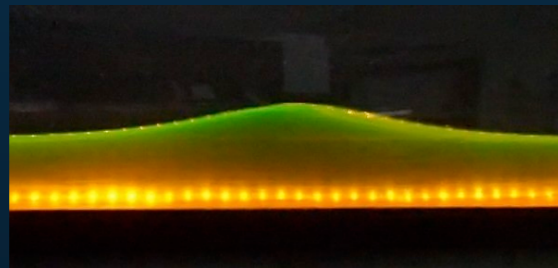
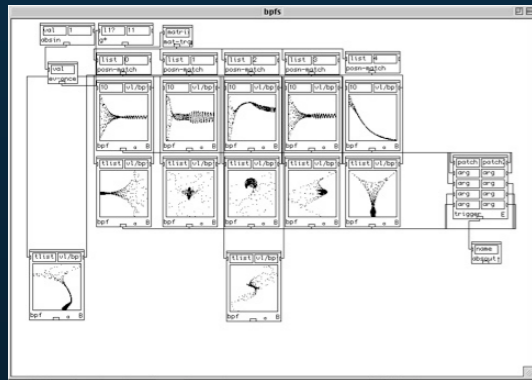
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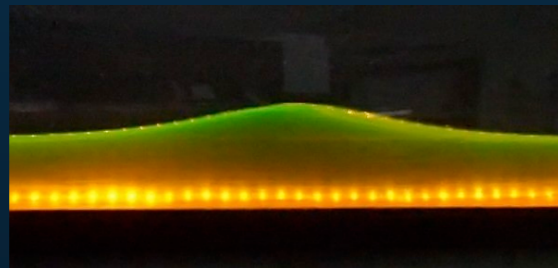
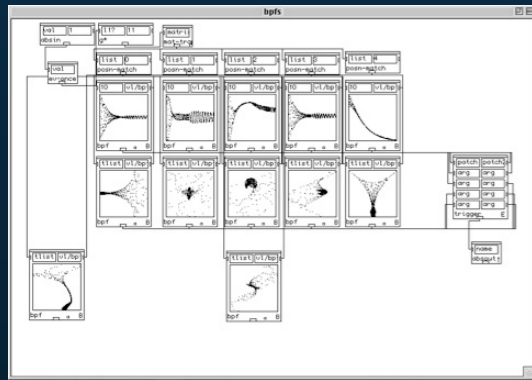
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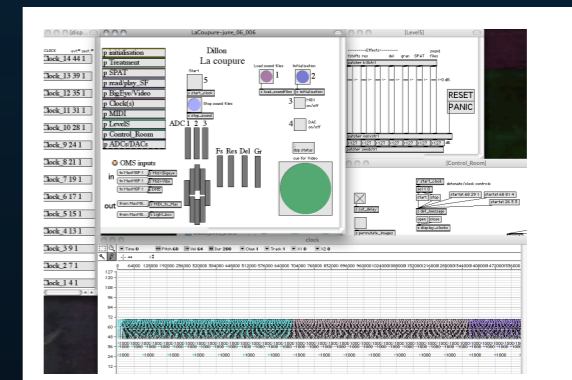


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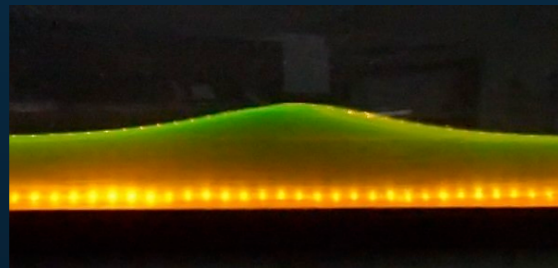
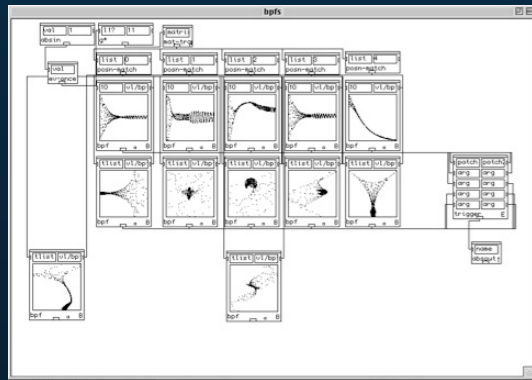
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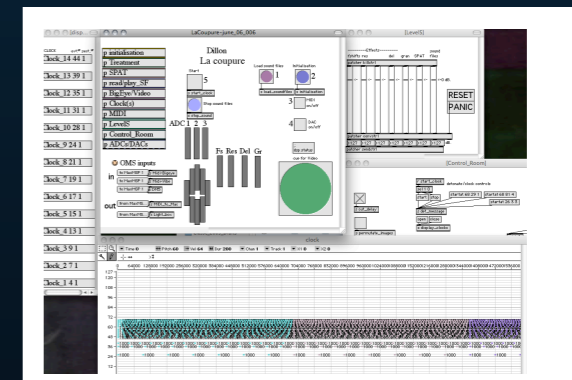


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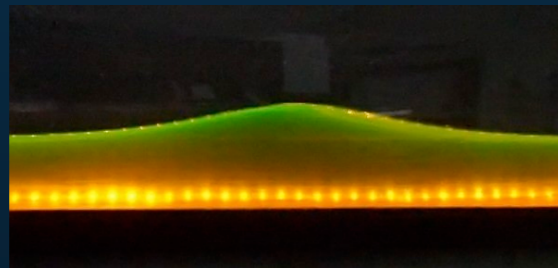
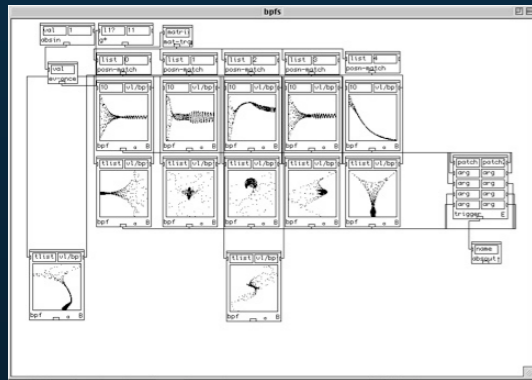
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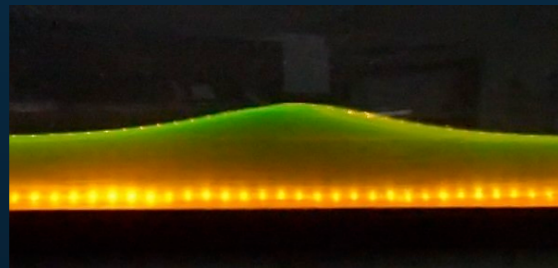
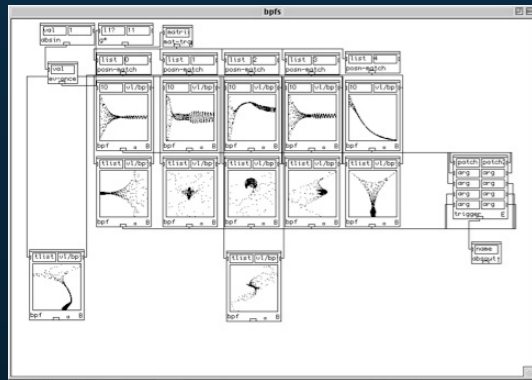
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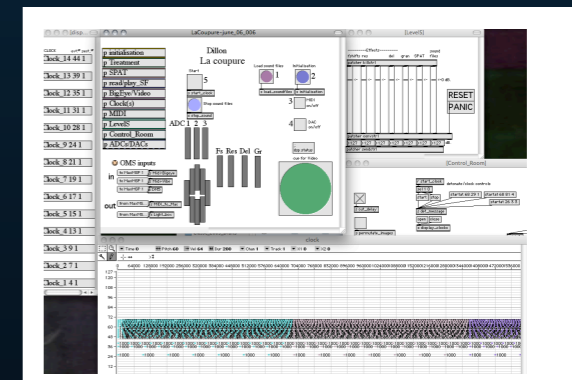


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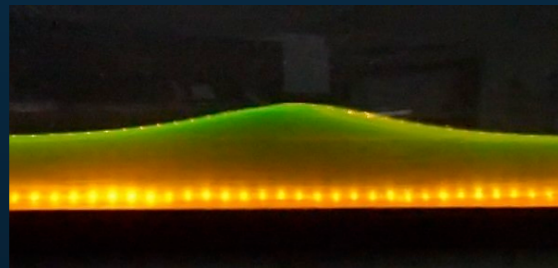
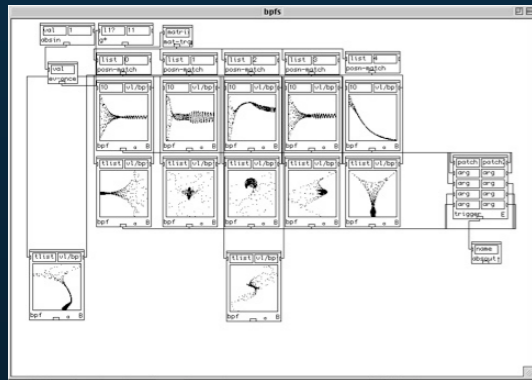
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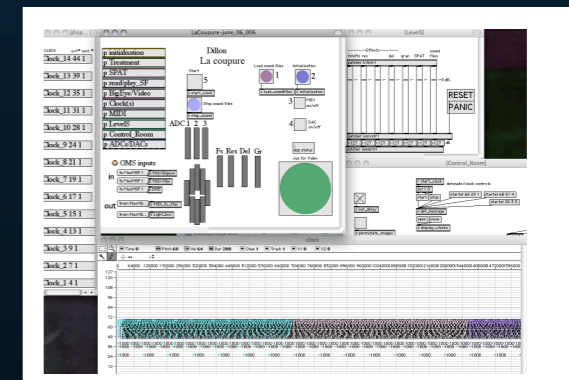


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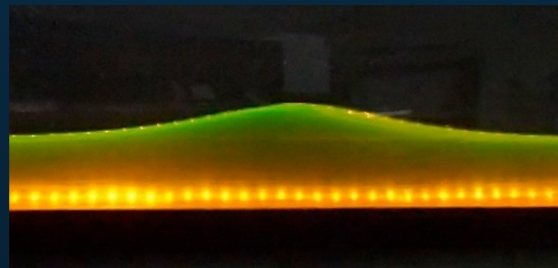
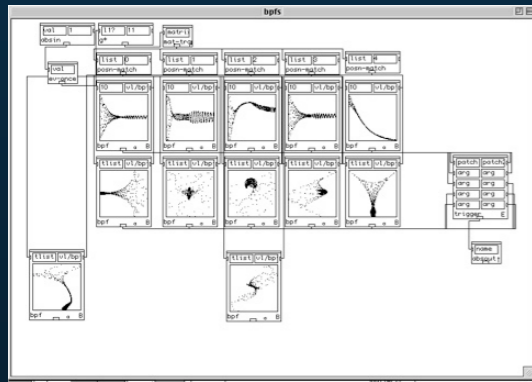
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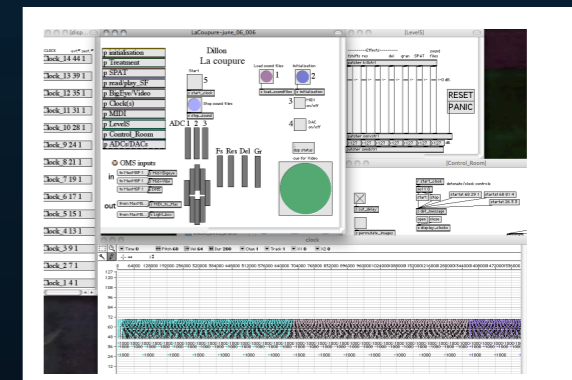


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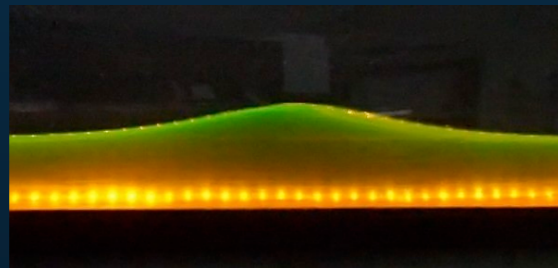
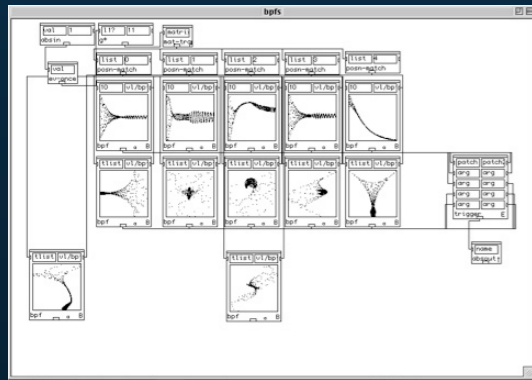
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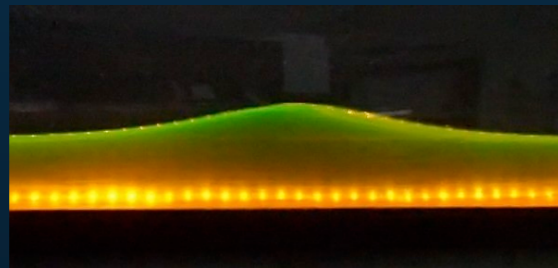
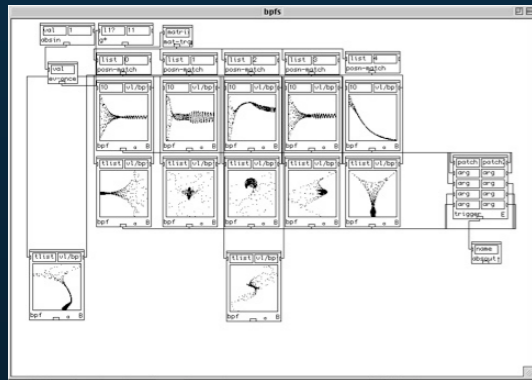
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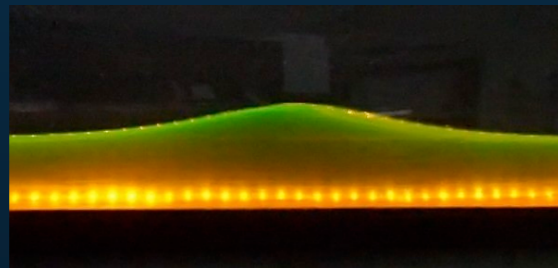
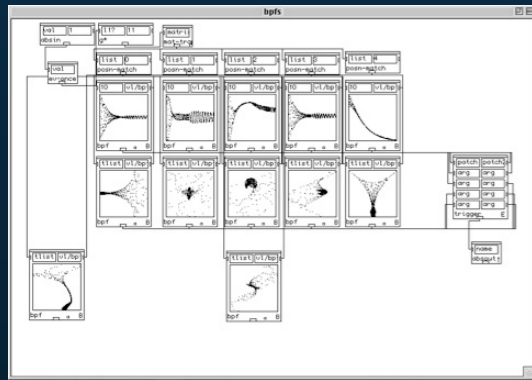
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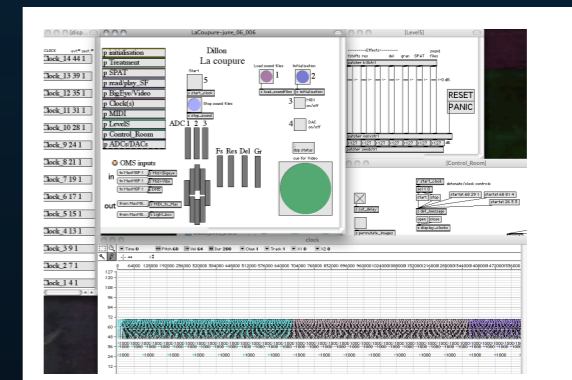


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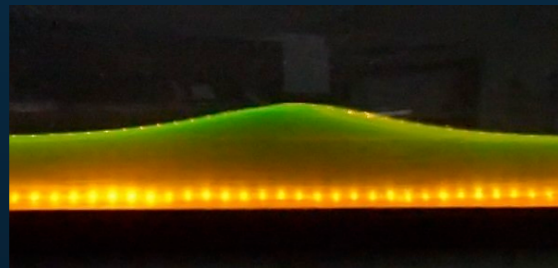
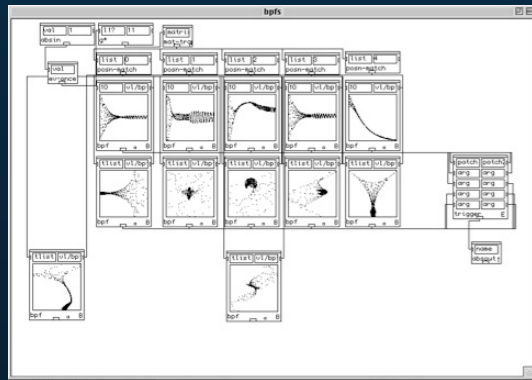
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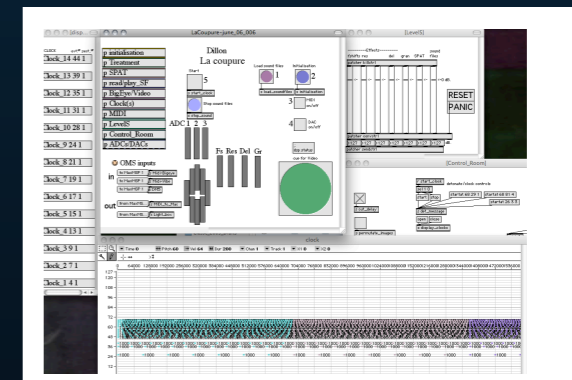


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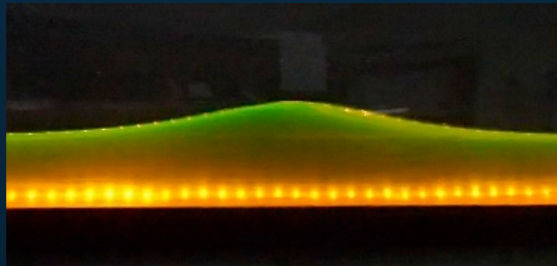
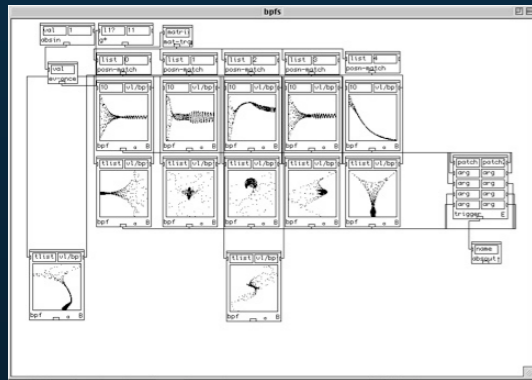
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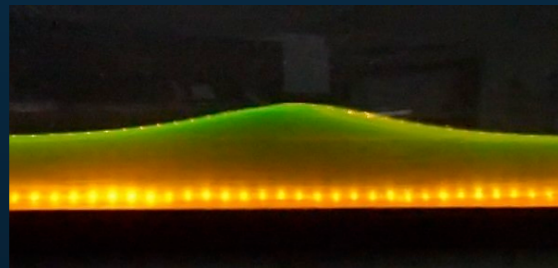
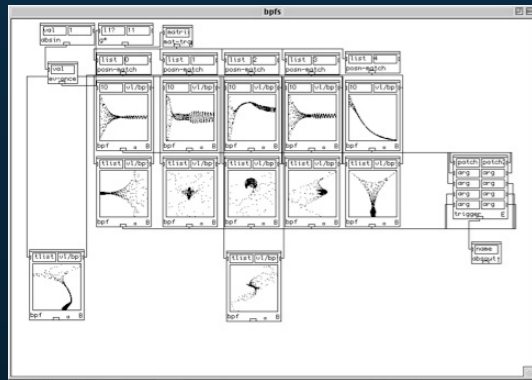
SPACE

GRANULAR SYNTHESIS

Dillon

des

modules

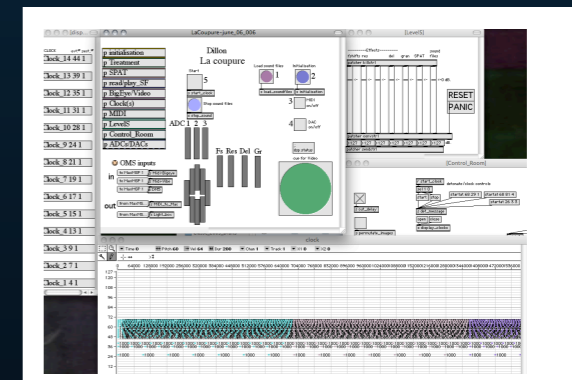


soliton

VBAP

Do you hear a clock?

opening



Harvey

Opening

Harmonic analysis

specific spatiliazation

Stretch

Wagner spect

REPMUS

CHAOS

COMPLEX SYSTEMS

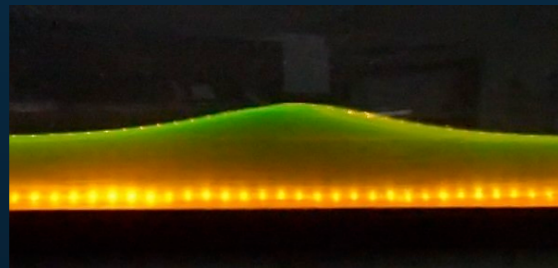
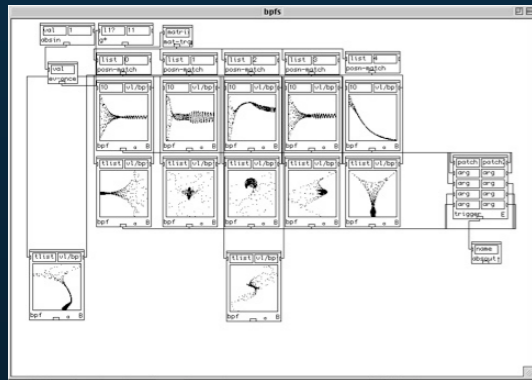
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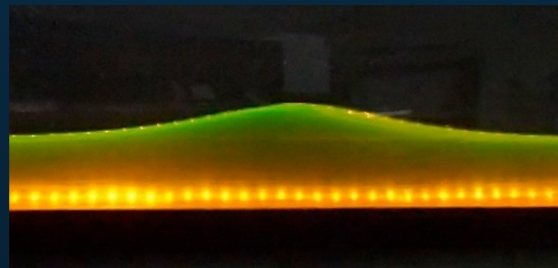
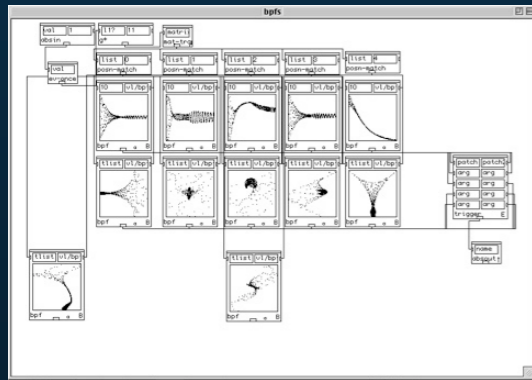
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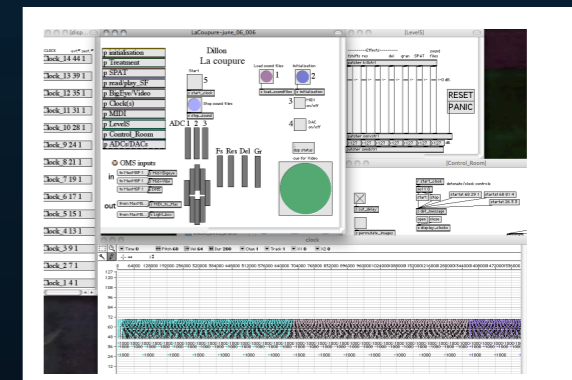


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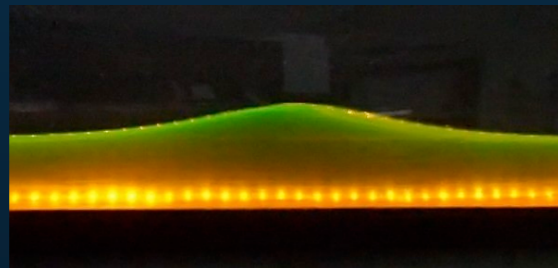
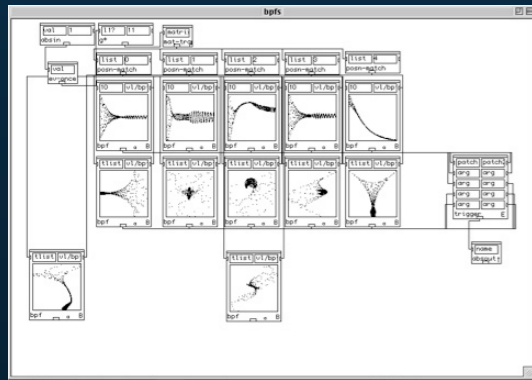
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The image displays a complex Max/MSP patch titled "Dillon La coupure". The patch is organized into several functional areas:

- Top Left:** A "CLOCK" section with a "Clock 14 44 1" object and a "p initialisation" sub-patch.
- Top Center:** A "Start" button and a "Load sound files" section with a "1" button and "s load_soundfiles" object. Below this is a "p ADCs/DACs" sub-patch.
- Top Right:** An "Initialisation" section with a "2" button and "s initialisation" object. Below it are "3 MIDI on/off" and "4 DAC on/off" checkboxes, and a "dsp status" object.
- Center:** A large spectrogram visualization showing a signal with a rising frequency component over time.
- Bottom Left:** A vertical stack of "Clock" objects labeled "Clock_9 24 1" through "Clock_2 7 1".
- Bottom Center:** A "clock" section with a "Time 0" display and various control objects like "Pitch 6r", "200", "Task 1", "X 0", and "Y 0".
- Bottom Right:** A "Control_Room" section containing a "detonate/clock controls" sub-patch with "start", "stop", "startat 68 29 1", "startat 68 81 4", and "startat 26 3 3" objects, along with "s det_message", "open", "close", "s display_clocks", and "s permute_images" objects.
- Right Edge:** A vertical strip with "RESET" and "PANIC" buttons.

At the bottom of the image, there is a spectrogram plot with a time axis from 0 to 1088000 and a frequency axis from 12 to 127. The plot shows a dense field of spectral activity, with a prominent horizontal band of energy around frequency 60-70. Below the spectrogram, there are several rows of numerical data, likely representing amplitude or phase values over time.

REPMUS

CHAOS

COMPLEX SYSTEMS

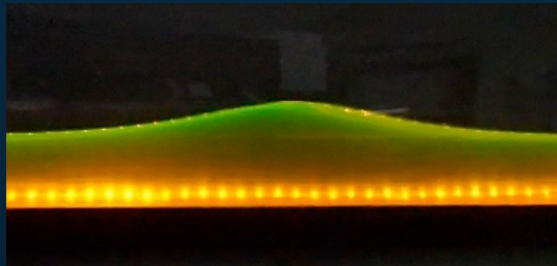
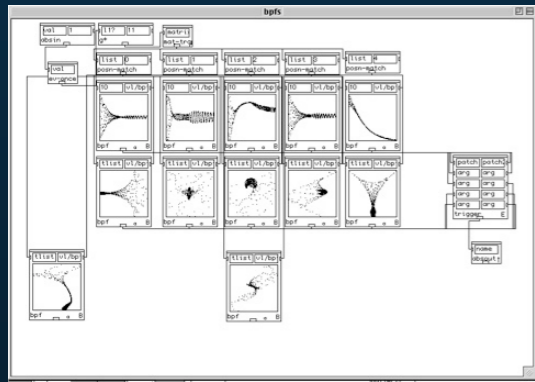
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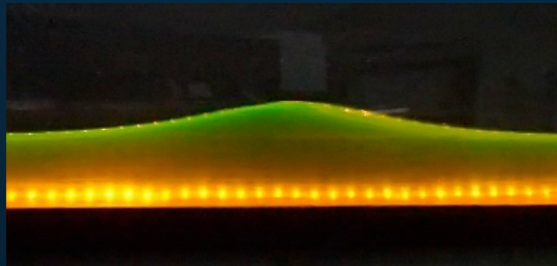
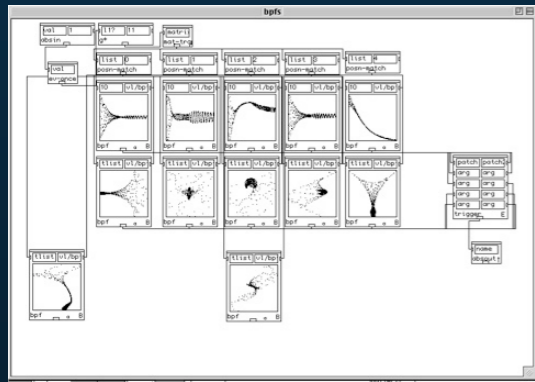
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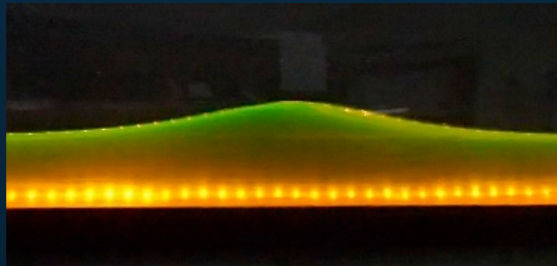
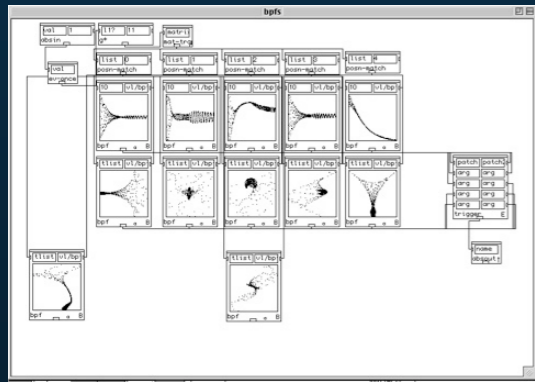
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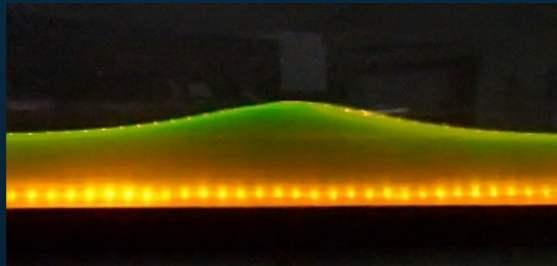
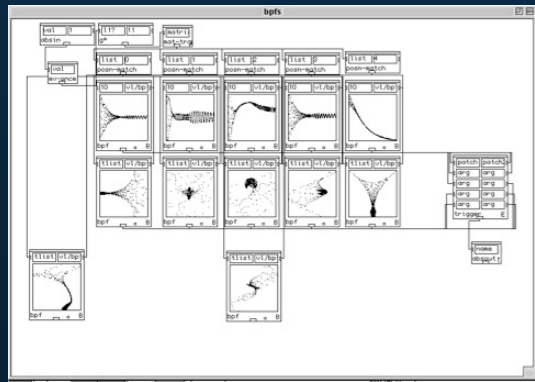
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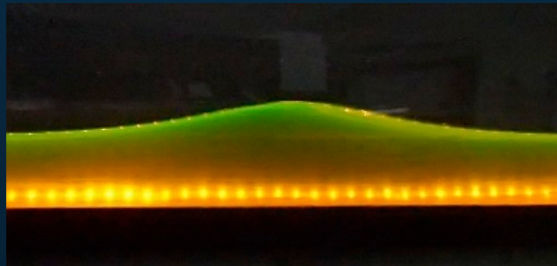
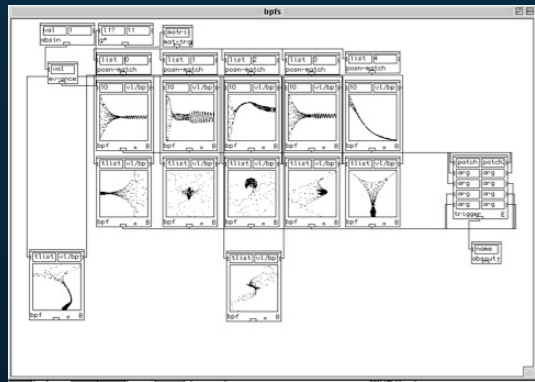
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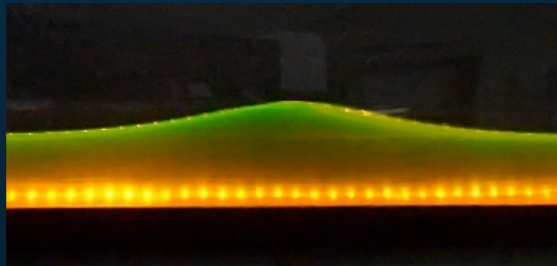
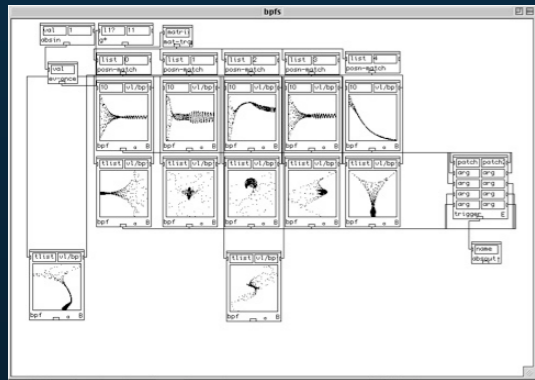
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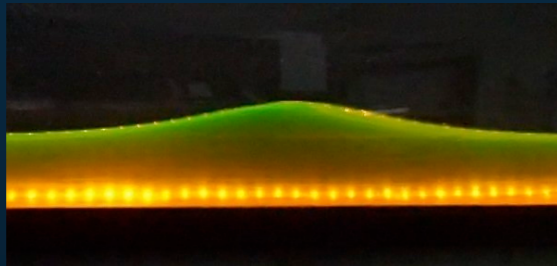
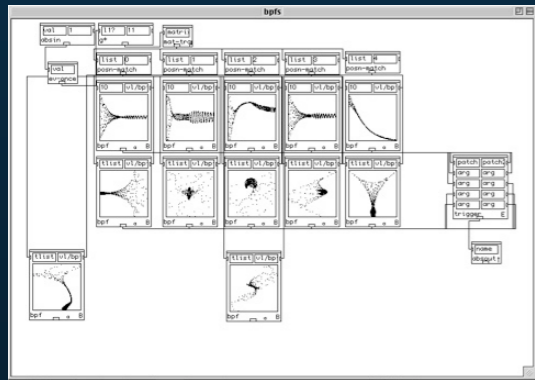
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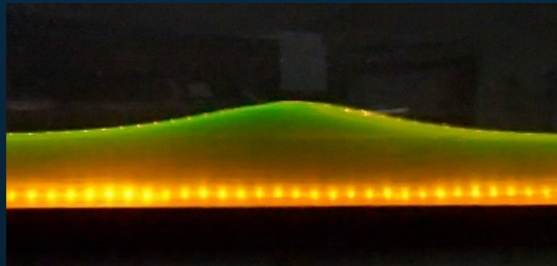
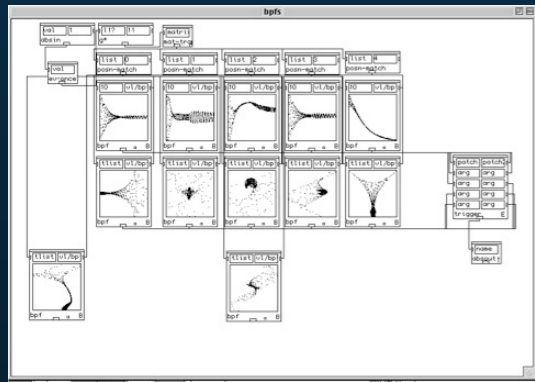
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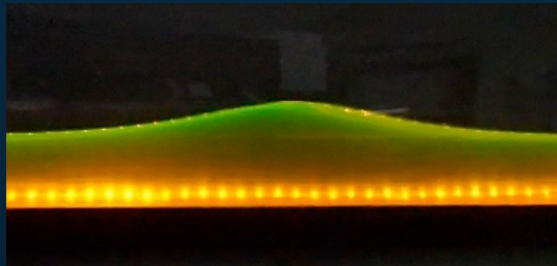
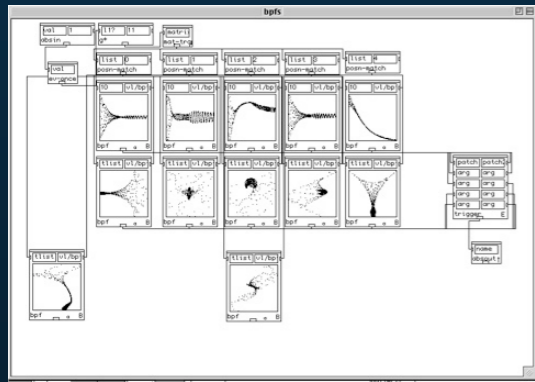
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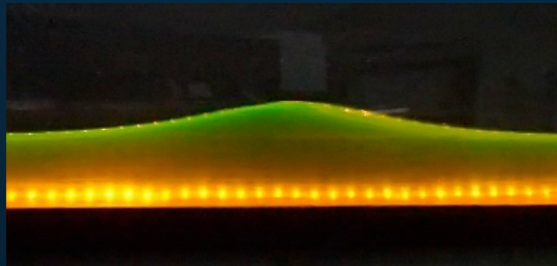
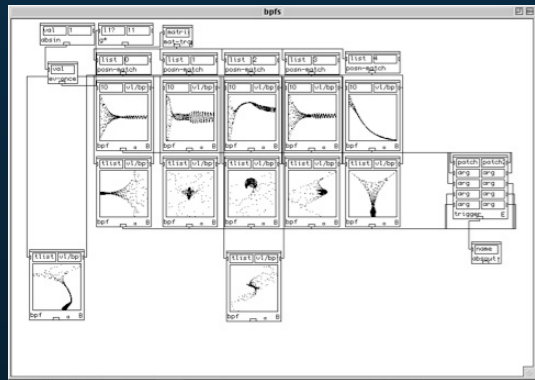
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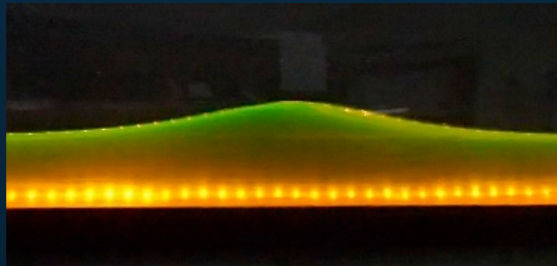
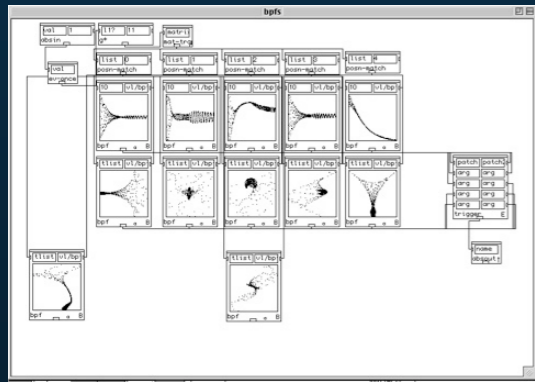
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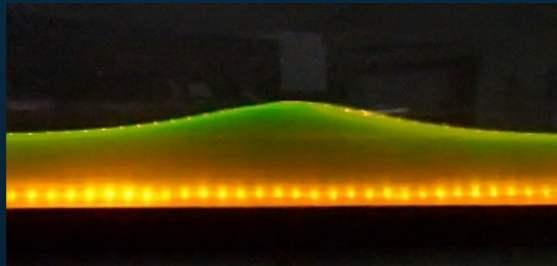
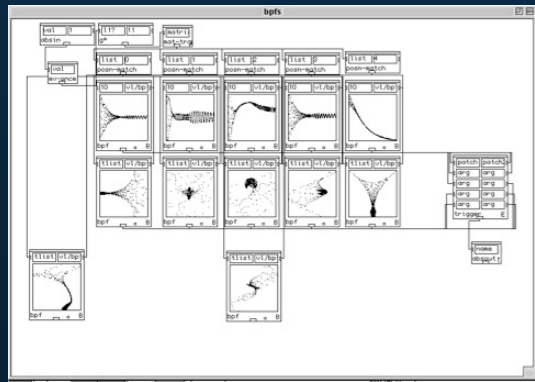
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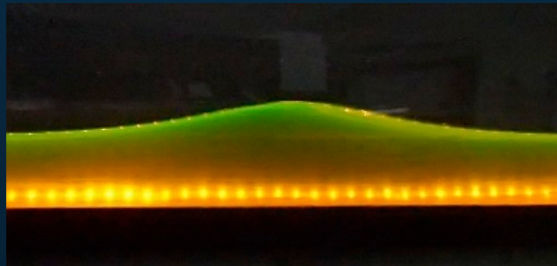
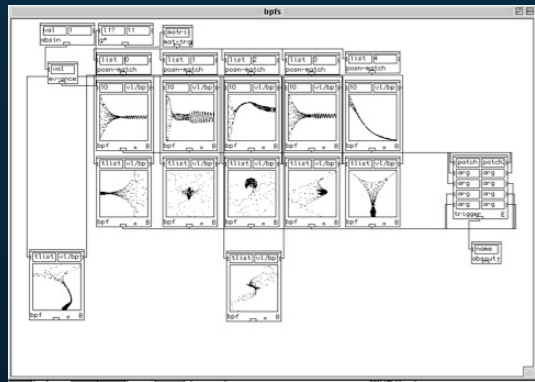
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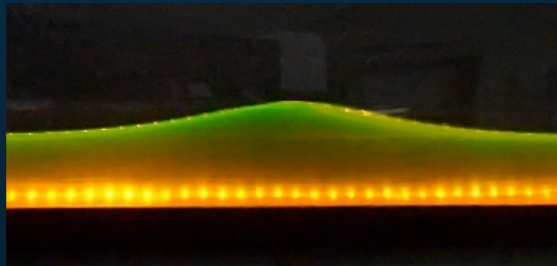
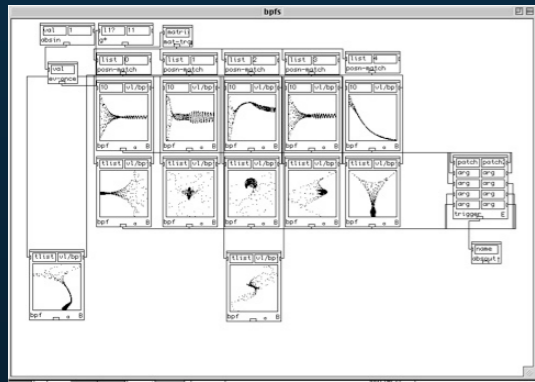
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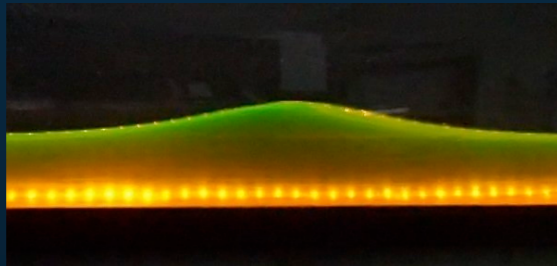
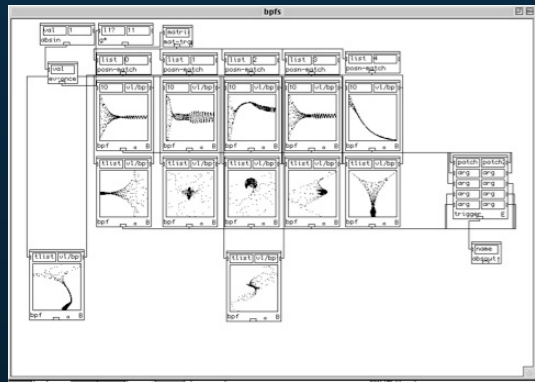
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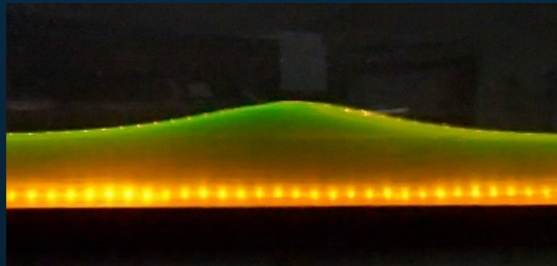
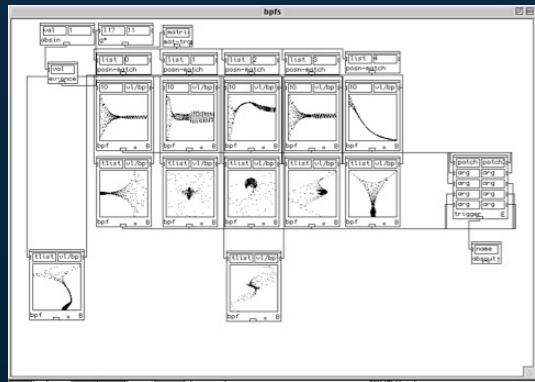
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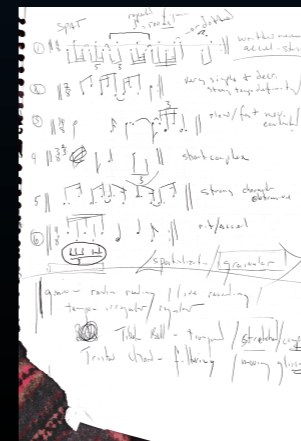
Opening

Harmonic analysis

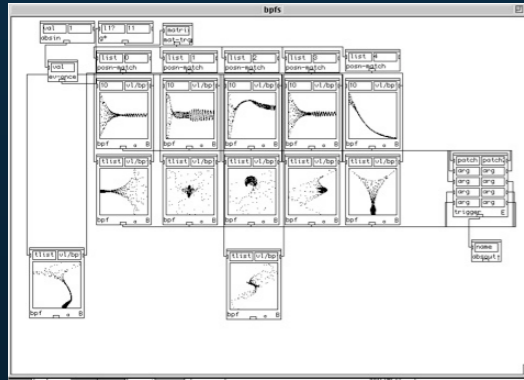
specific spatiliazation

Stretch

Wagner spect



Dillon



opening

Harvey

Stretch

SPAT

repeats
N = 500
- or dotted

① written manual accel - stris

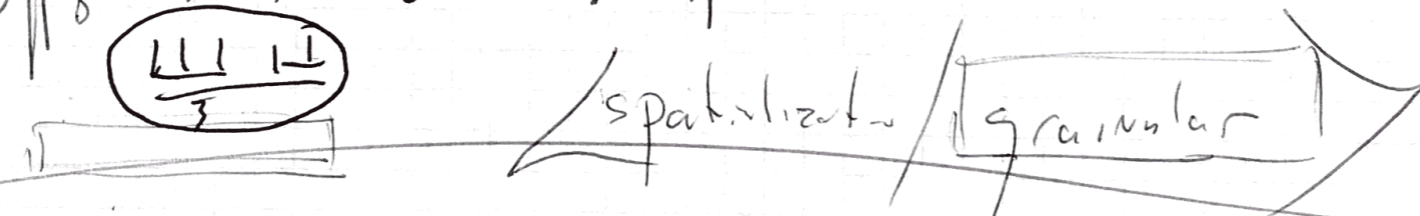
② very simple & decr. strong tempo def. \checkmark

③ slow / fast mov. ear hook

④ short complex

⑤ strong character @btrusive

⑥ rit / accel



|| gran - random reading / lose recording / tempo irregular / regular

~~Reverb~~ Tibetan Bell - trumpet / stretched / compressed
 Tristar chord - filtering / moving glissandi

ules

you hear a clock?

spatialization

REPMUS

CHAOS

COMPLEX SYSTEMS

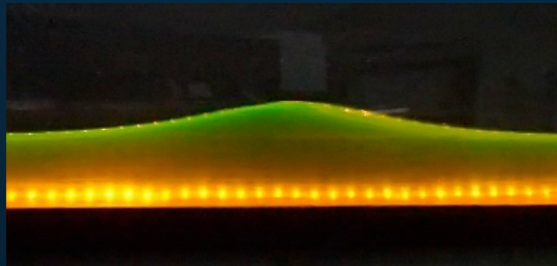
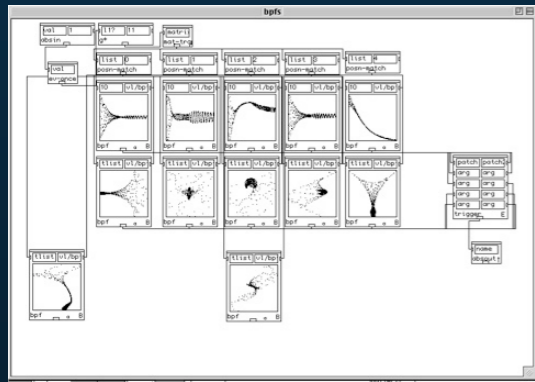
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BONUS

BONUS



QUESTION: IS THERE ENOUGH EVIDENCE THAT CHINA MISLED THE GLOBAL COMMUNITY OVER COVID-19?

PRESIDENT TRUMP TOWN HALL

QUESTIONS

On computer models, AI and computer aided composition

What of inspiration?

If a computer made it, who does it belong to?

Is it necessary to “follow the code” to be valid?

How important is personal experience in the act of creation?

Let's ask Chat

Can we qualify the computer (AI, an algorithmic process, etc.) as collaborator?

or, is it just a tool for achieving what would be impossible without it?

What of sonification?

What happens when AI asks for copyright?

RIM as the perfect Peripheral?

Is there, should there be a CAC common practice?

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On computer models, AI and computer aided composition

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can you be creative



Yes, I am a large language model trained by OpenAI and I have the ability to generate text based on the input I receive. I do not have personal experiences or emotions, so my creativity is limited to the text I generate based on the input I receive.



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