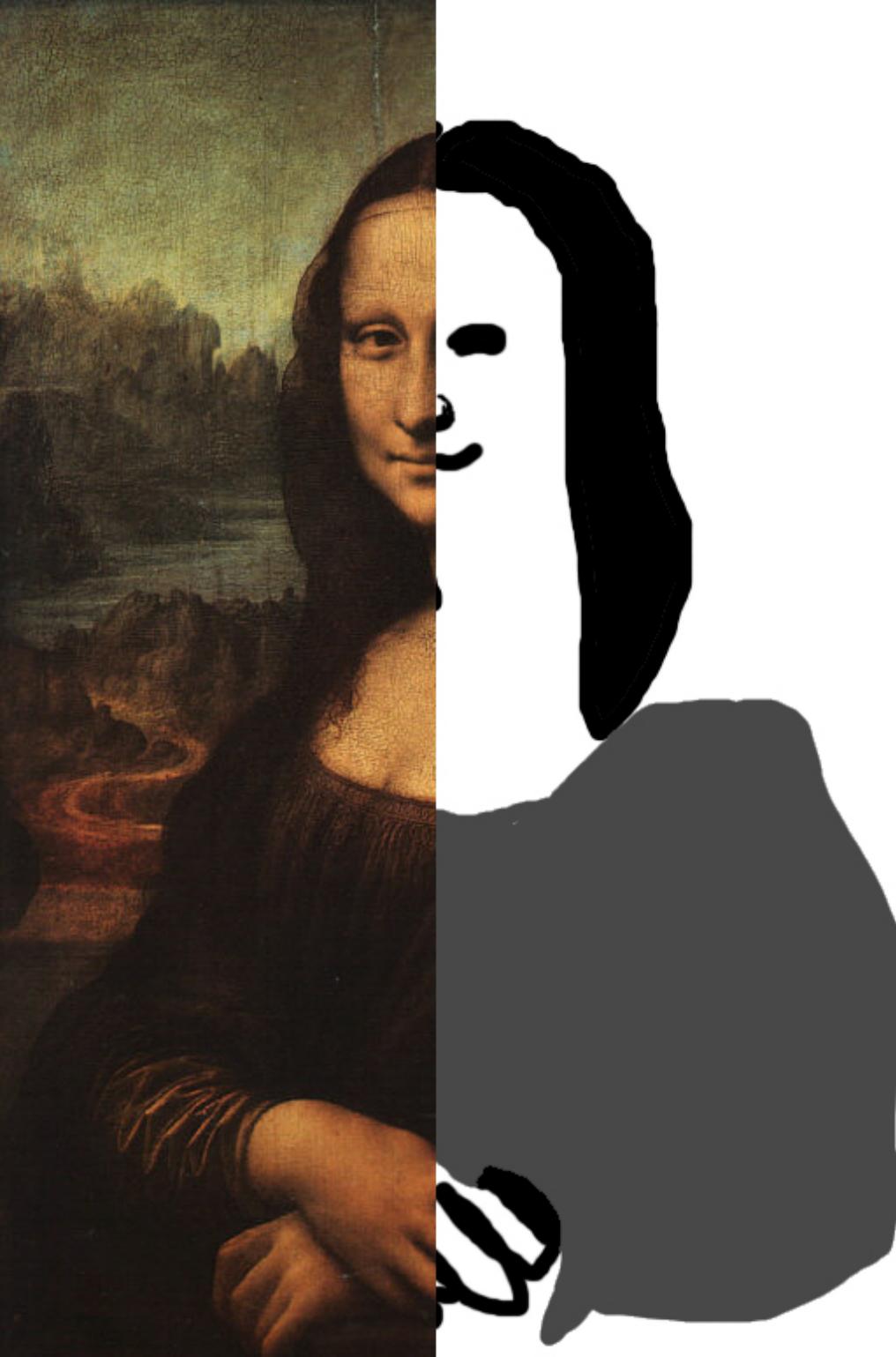




# workshops in creative coding

Dr. Theo Papatheodorou

# introduction



## **Computer Vision:**

A set of algorithms that allow computers to understand images.

3D face recognition  
by machines

**Imperial College  
London**

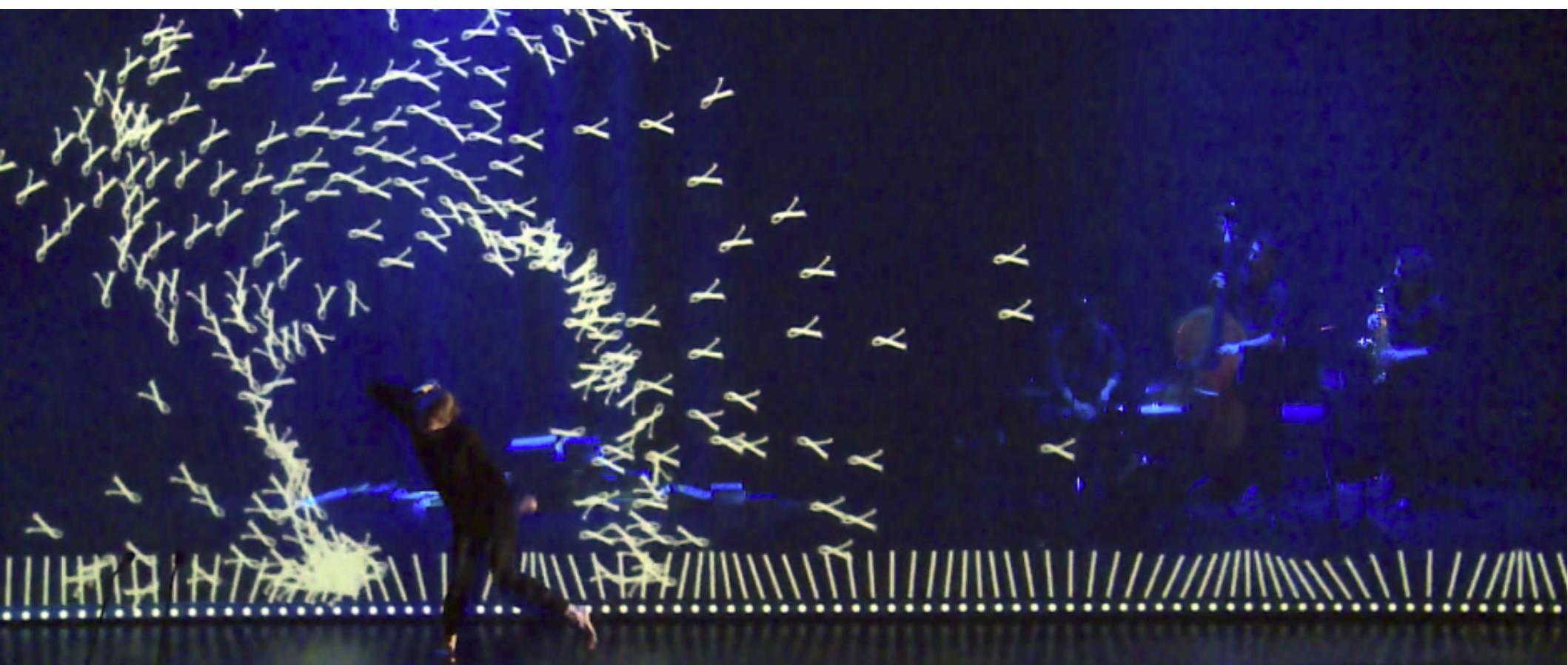


# Athens School Of Fine Arts



random quark

creative technology studio



# class purpose



- provide a fundamental understanding of code and modern computer literacy.
- introduce you to a range of techniques for creating interactive audiovisual software in C++
- develop your artistic practice
- assist you in delivering two large software projects



**OpenFrameworks**

# class structure

- 1<sup>st</sup> term
  - syllabus
  - assessment
- 2<sup>nd</sup> term
  - syllabus
  - assessment



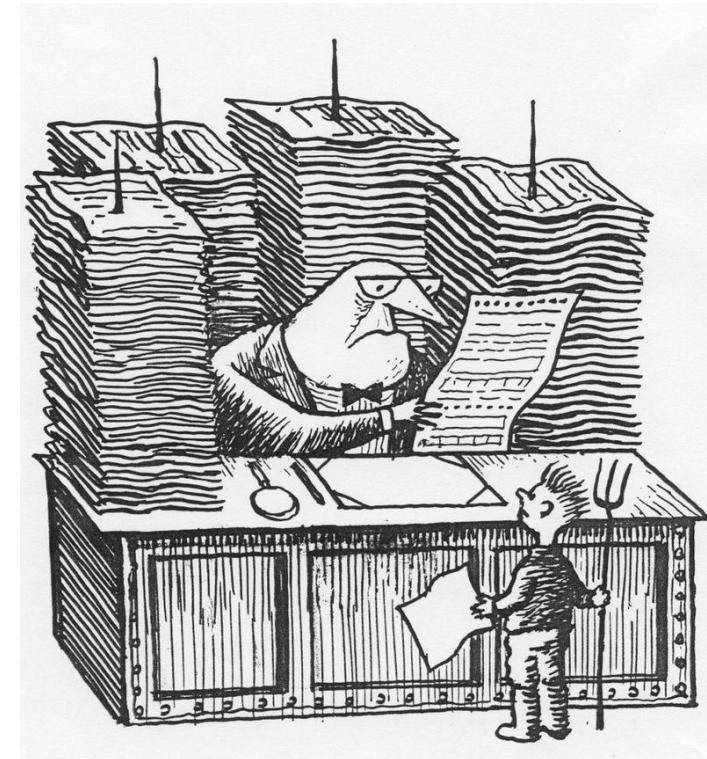
Mixing different abilities in the classroom



<http://learn.gold.ac.uk>

# bureaucratic

- Email: theo@gold.ac.uk
- Workshops in Creative Coding website on learn.gold:  
<https://learn.gold.ac.uk/course/view.php?id=6852>  
enrollment key: **linux**
- MA/MFA Computational Arts website on learn.gold:  
<https://learn.gold.ac.uk/course/view.php?id=8973>
- absence policy: <http://registermate.doc.gold.ac.uk>
- Assessment:
  - lab+home assignments: 10%
  - end of term project: 90%
  - see class website for details



# Pop-up exhibition

at the end of term

- We'll book the church
- You'll have it for 2 days
  - 1 day to prepare, 1 day for exhibition
- Great way to practice
- Showcase your work
- All modules on MA involved



# Communication



- Learn.gold – [forum of class:](#)
  - code problems
  - technical issues
  - syllabus questions
  - things you didn't understand in class
- [Forum on MA/MFA learn.gold page:](#)
  - events / announcements
  - cool links
  - Exhibitions
  - MA/MFA related questions

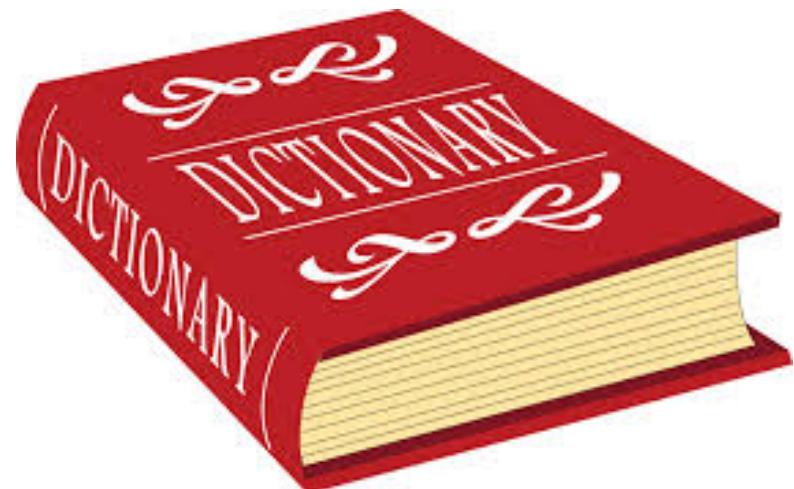
# what is computational art?

“Could the artwork have been made without the use of a computer?”

“Does it take advantage of the computer’s unique capabilities?”

Roger Malina

SIGGRAPH '89, Leonardo Special Edition



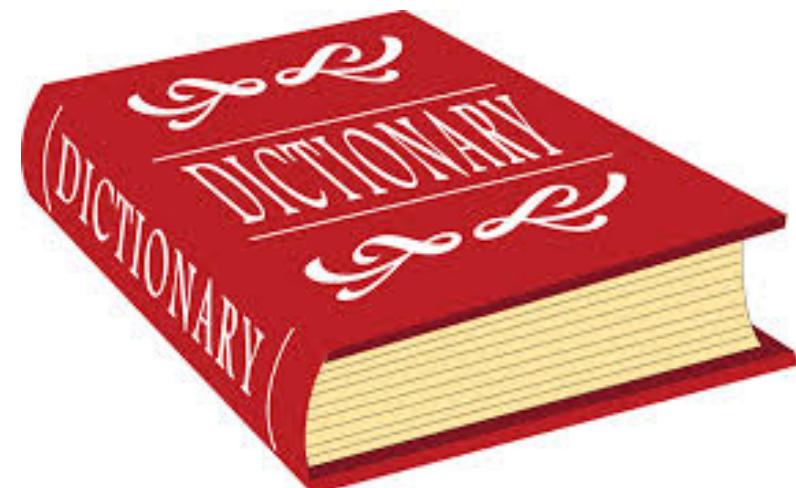
# what is computational art?

“The computer’s utility in speeding up artistic operations can be justified as an artistic act.”

“Does your work with the computer affect the direction of your results?”

Aldo Giorgini – 1975

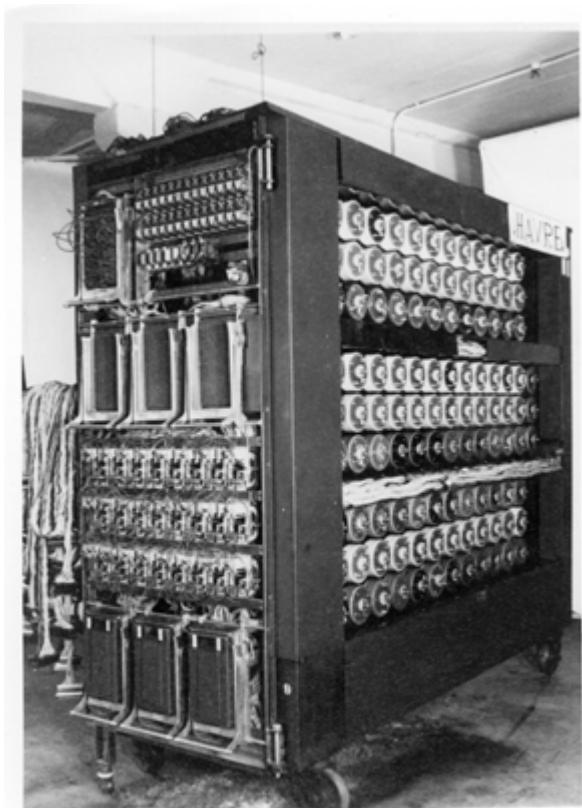
[source](#)



# 40s

## code + art

- programming: a difficult task
- designers + artists have different requirements than engineers and scientists
- C++/Java take years to master



*"The world was at war. Complex calculations had to be done under time pressures not normally felt by mathematicians. It's unlikely that they gave even a passing thought to making computers user-friendly to people with softer styles than theirs."*

- Seymour Papert

# 50-60s

## code + art

- artists experimented with themes related to software and system aesthetics
  - [Cybernetic Serendipity](#) exhibition (ICA, 1968)
  - Hans Haacke's [Visitor's Profile](#) (1971)



# Cybernetic Serendipity

## Serendipity

Serendipity

the faculty or making  
happy chance discoveries of

means of control and communication machines  
both human and electronic

An exhibition

In America, serendipity has been used to  
mean the faculty and the capacity to make  
happy chance discoveries of means of control  
and communication machines both human and  
electronic.

Computer generated graphics  
computer programmed machines  
computer music  
computer poetry  
computer writing  
computer cinema

and

other  
serendipitous  
manifestations

Institute  
of Contemporary  
Arts

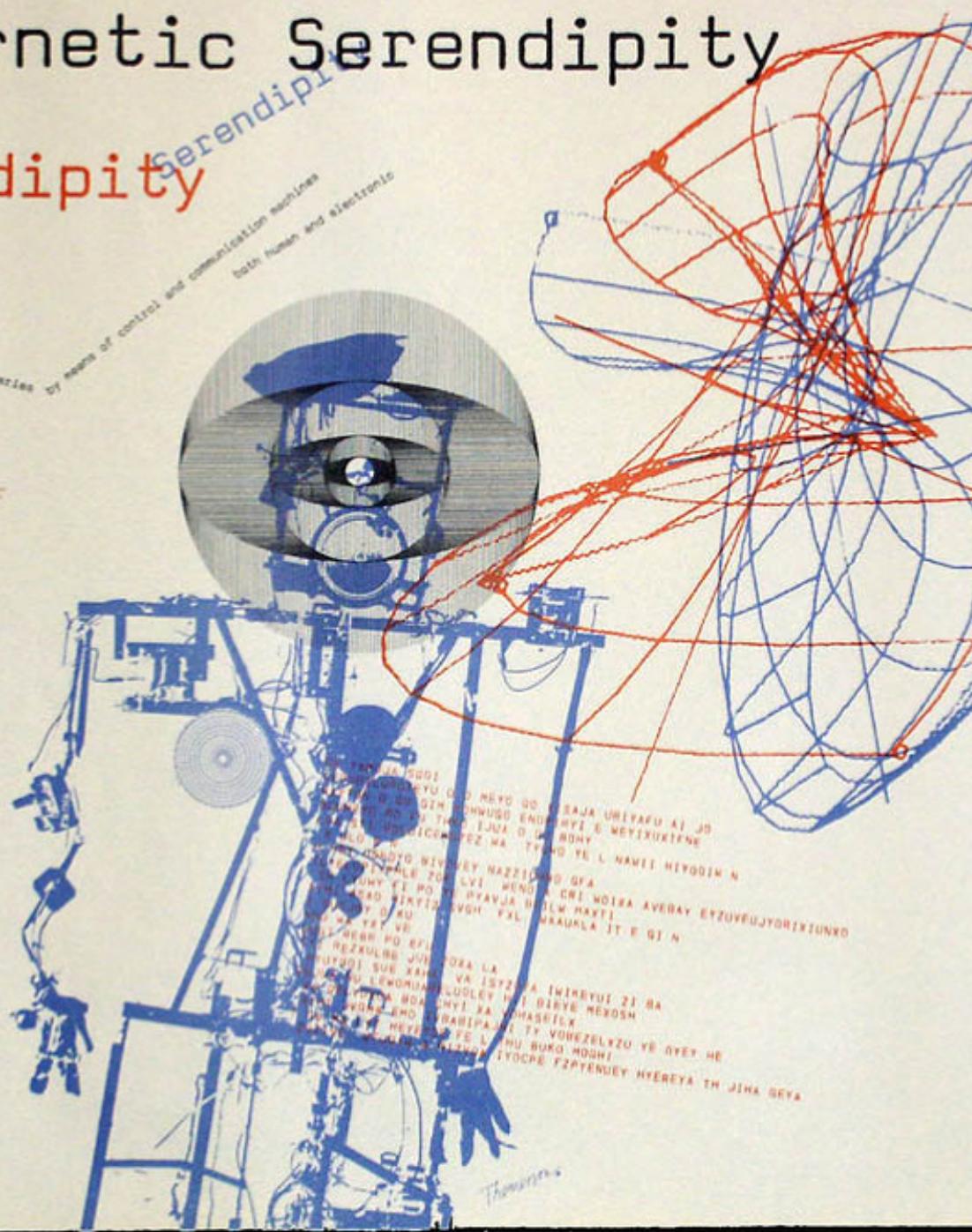
August 3 - October 26



Institute of Contemporary Arts  
Book Issue The Best Number 800  
August 3 - October 26

Curators, Producers, Selections  
August 3 - October 26  
Gordon  
Kraus  
Kraus

Additional Information and Reservation  
Post Address  
Gordon Kraus



### CYBERNETIC SERENDIPITY LECTURES

10

August 7 - October 26, 1968  
During the course  
of the Cybernetic Serendipity exhibition  
at the Institute of Contemporary Arts  
in London, the BBC, London 1, 2 &  
3, a series of lectures will be held  
including:

1. 10

at the Institute of Contemporary Arts

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at the Faculty of Mathematics,  
University of Cambridge, Cambridge, England

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at the University of Bristol, Bristol, England

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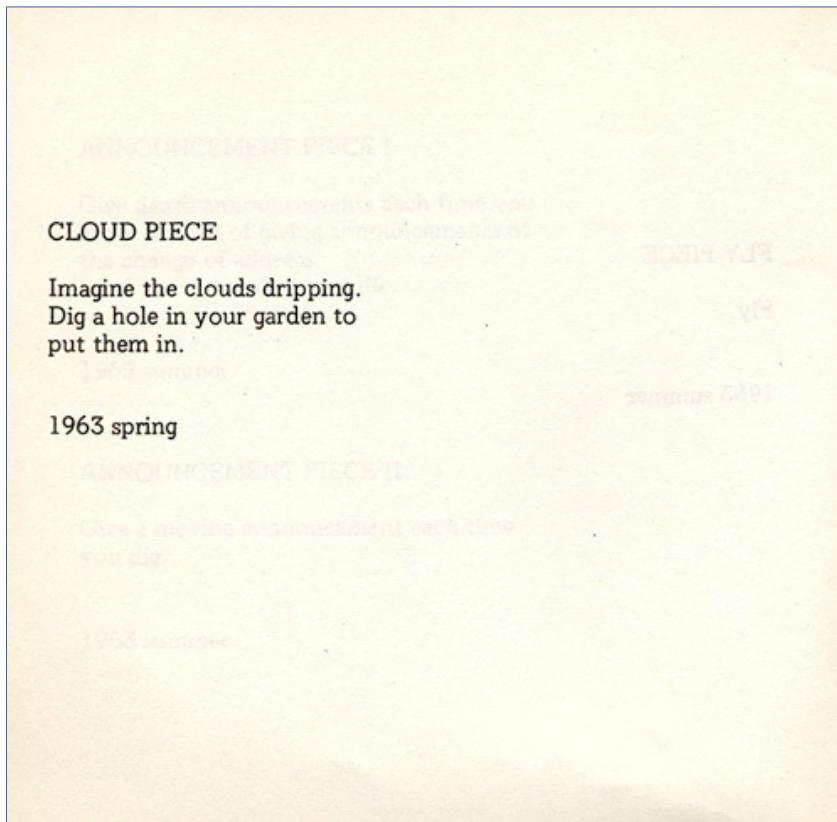
138

at the University of Bristol, Bristol, England

# 50-60s cont.

## code + art

- process-based art
  - instructions and diagrams as a form of art



Yoko Ono (1963)

### PROPOSAL FOR WALL DRAWING, INFORMATION SHOW

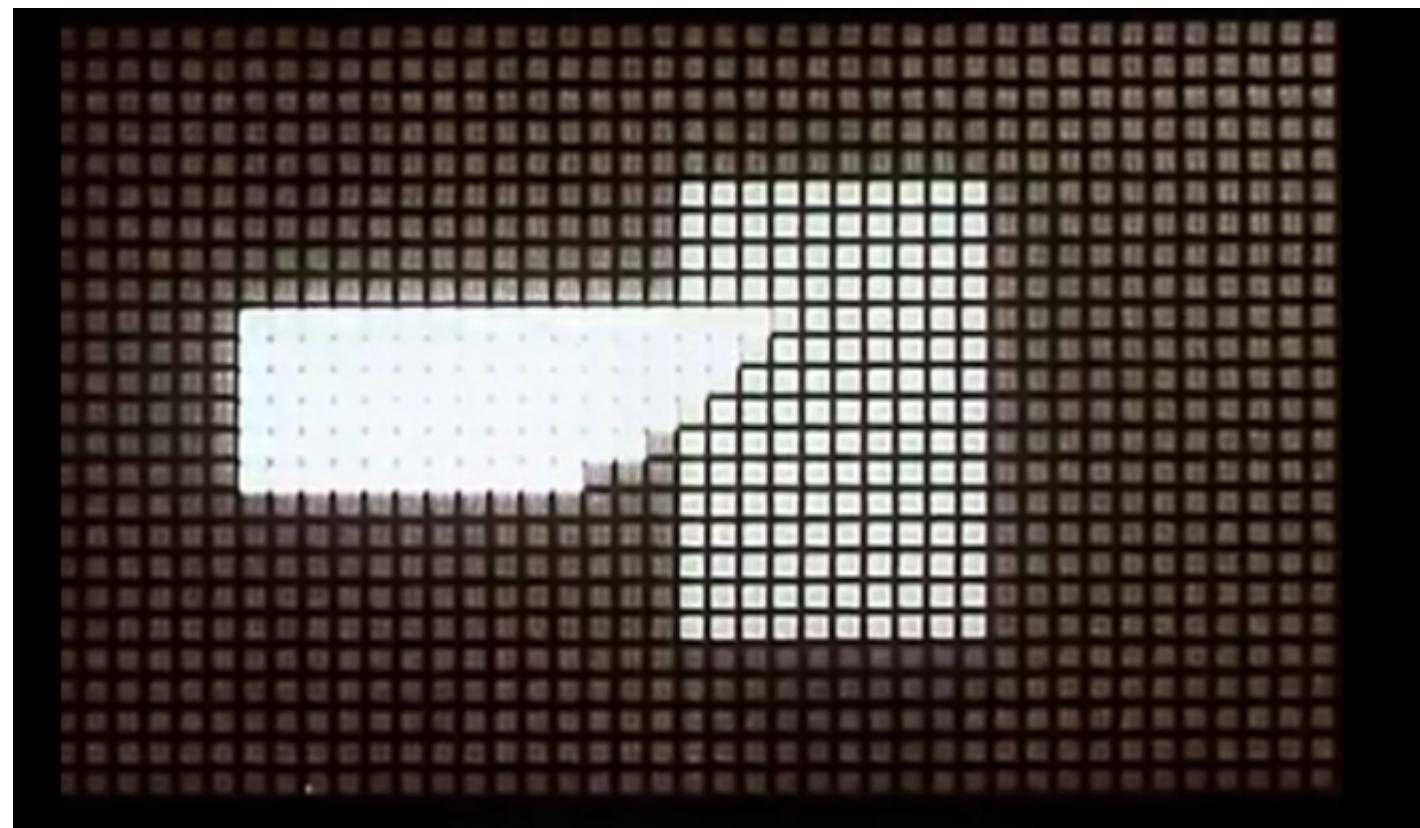
Within four adjacent squares,  
each 4' by 4',  
four draftsmen will be employed  
at \$4.00/hour  
for four hours a day  
and for four days to draw straight lines  
4 inches long  
using four different colored pencils;  
9H black, red, yellow and blue.  
Each draftsmen will use the same color throughout  
the four day period,  
working on a different square each day.

Sol LeWitt (1970)

50-60s cont.

meanwhile the engineers...

BEFLIX (Bell Labs) – [early computer graphics](#)

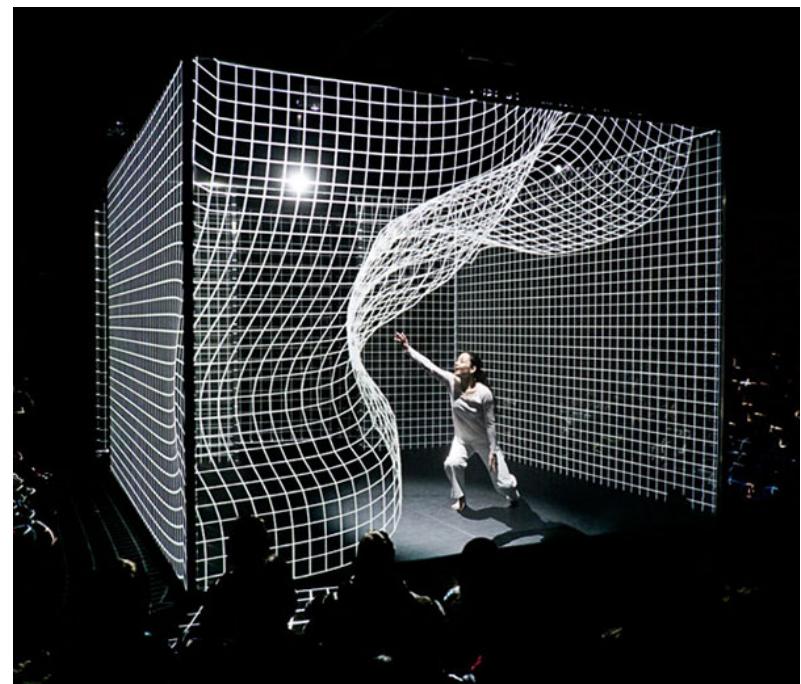


80s - today

# code + art



- proliferation of the personal computer
- programming reaches wider audience
- Lingo was developed
  - first language used by designers and artists up to early 90's
- code is used today not just for controlling pixels
  - controls motor parts of installations
  - architecture
  - decision making + smart interaction
  - design



# why code?

Tradition of artists creating their own tools as old as art itself.



Software revolution and the “Photoshop effect”



From paint to code





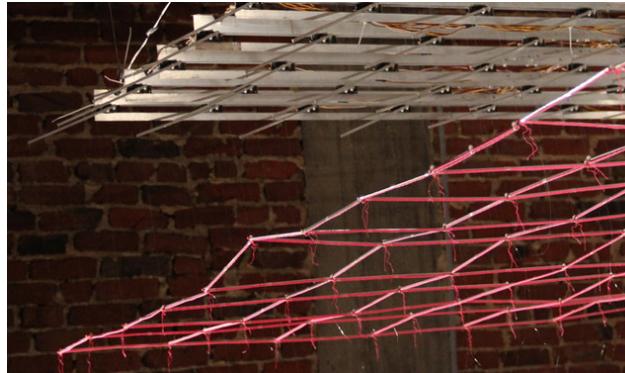
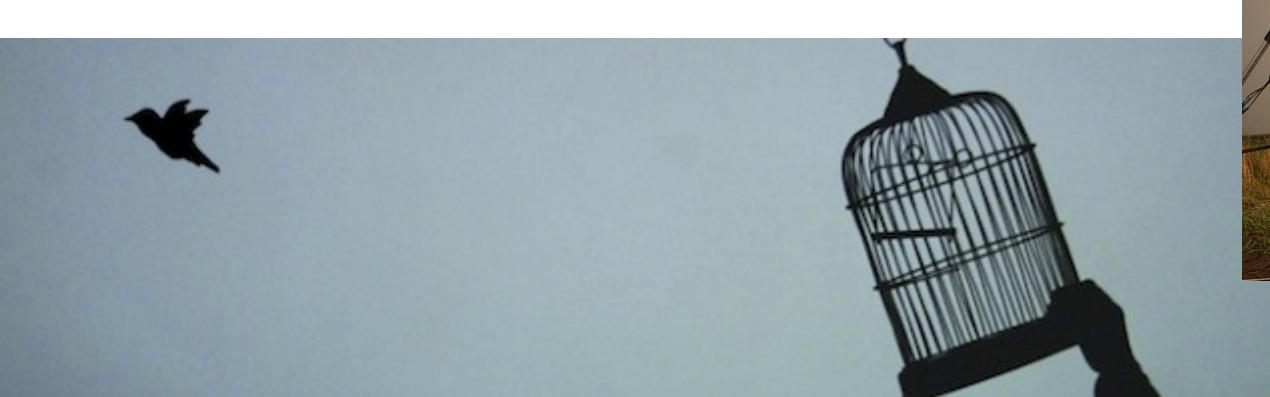
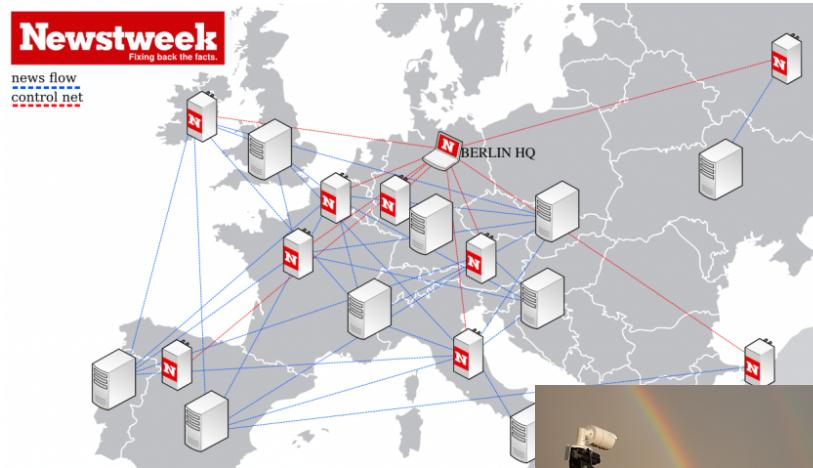


# code + art

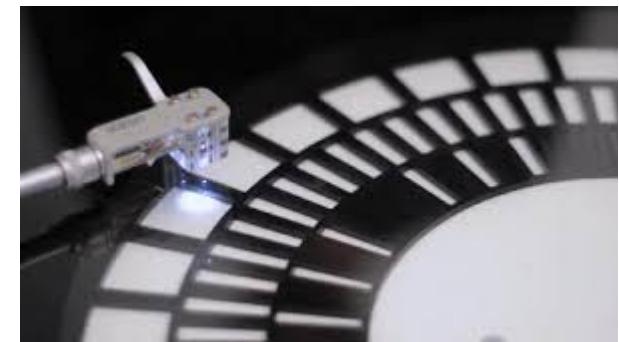
## conclusions

- observer vs. observed
- new modes of expression
- non-linear narrative
- New ways of I/O
- exceed limits of proprietary packages
- gateway to new media
- computer becomes a medium, not a tool

# programming + art examples

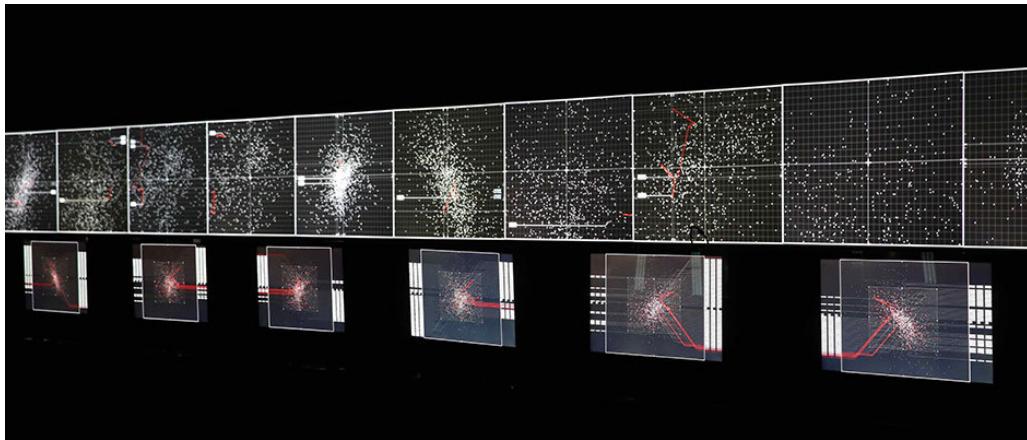


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ll be. FRIAR LAUREN  
S Thou wrong'st it, more  
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FRIAR LAURENCE Ho  
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alone; Let not thy nurse  
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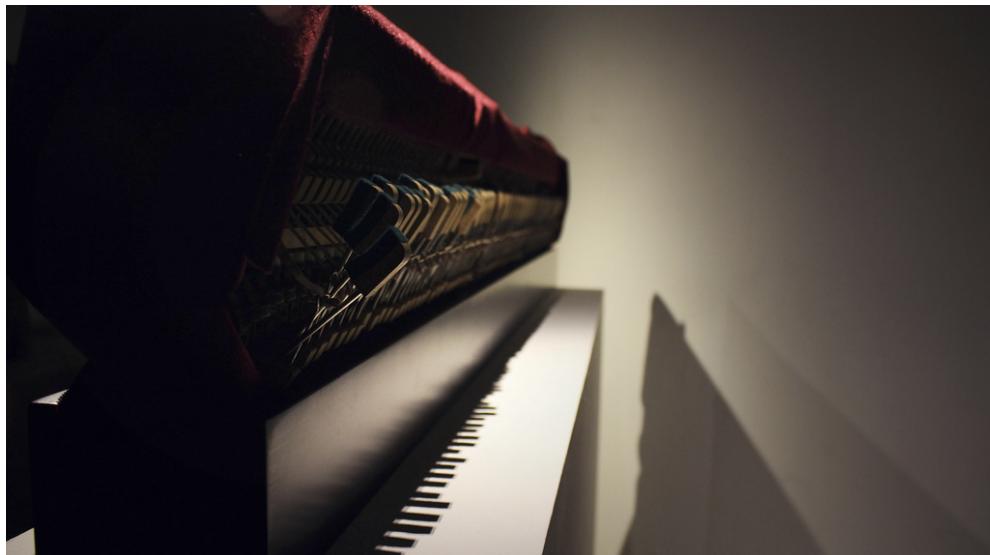
# programming + art

## examples (cont)



Your examples:

<https://goo.gl/tQm475>



# Enroll to class now!

<https://goo.gl/Z6jR5o>  
enrollment key: **linux**

## **Lab activity:** Meet & Greet



a bit more history...

# ...a bit more history

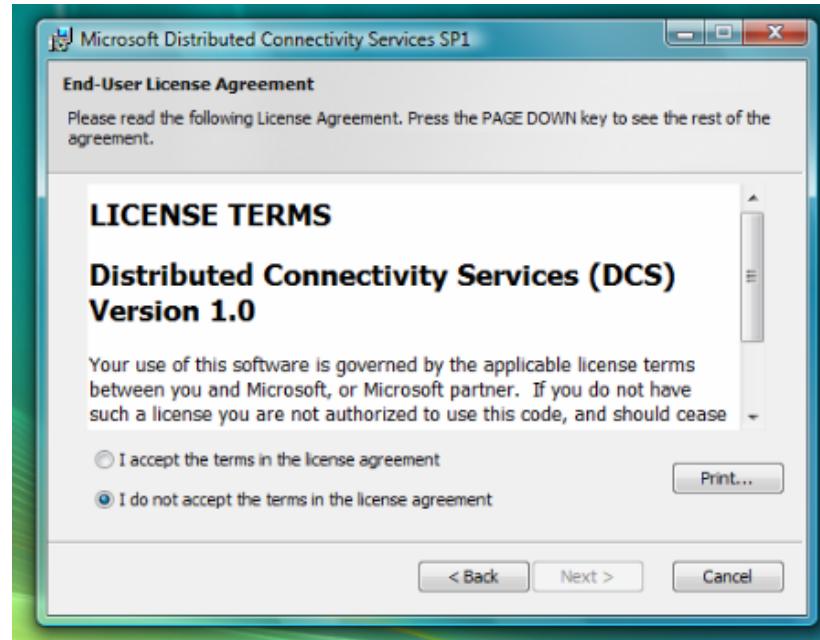


- Up until the late 70's users were able to study the source code of software, copy it and exchange it with each other
- But things were beginning to change since the end of the 60's:
  - increase in software costs
  - many users were asking for support
  - many users wanted to buy software separately
  - the software industry started competing with the hardware industry

# a change...



- In the late 70's companies started distributing binary copies of their software
- Laws on intellectual property were extended to software
  - a software was protected just like a song or novel
  - they started selling software licenses and not the actual programs



# Richard Stallman



# free software

## the basic freedoms

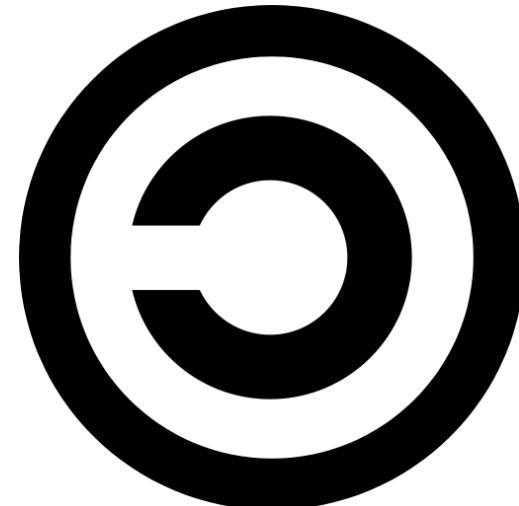
- **Freedom 0:** The freedom to run the program, for any purpose.
- **Freedom 1:** The freedom to study how the program works, and change it so it does your computing as you wish. Access to the source code is a precondition for this.
- **Freedom 2:** The freedom to redistribute copies so you can help your neighbor
- **Freedom 3:** The freedom to distribute copies of your modified versions to others. By doing this you can give the whole community a chance to benefit from your changes. Access to the source code is a precondition for this.

**FREE AS IN  
FREEDOM**  
**RICHARD STALLMAN'S  
CRUSADE FOR FREE SOFTWARE**

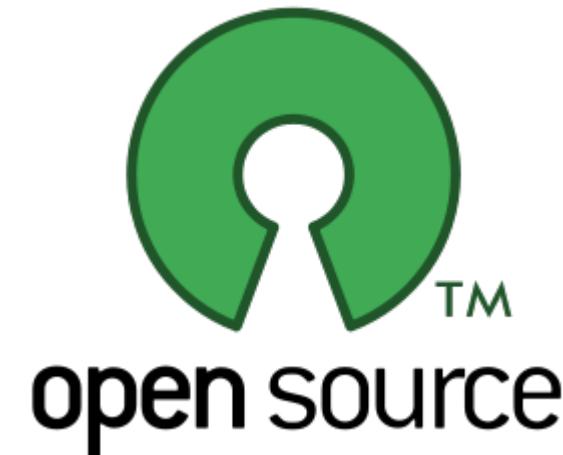


# GNU General Public License

- in 1989 publishes the GPL software license in which he also introduces *Copyleft*
- copyleft grants the freedom to use, modify and redistribute a intellectual creation...
- under the condition that every copy or modified work will be distributed with the same license (ie granting the same freedoms)
- Different from public domain



# free vs. open source



- open source: way of developing software
- free software: social movement



# Advantages of free software

- better code / better performance
- ability to use on an infinite number of machines
- free upgrades
- user not tied to a specific company / provider
- reduced risk for malware / viruses (see NASA)
- security (see NSA)
- ability to change the source code to fit your needs
- reduced costs



# requirements



- Windows 8, hardware requirements

Architecture	32-bit	64-bit
Processor	1 GHz IA-32 processor	1 GHz x86-64 processor
Memory (RAM)	1 GB	2 GB
Graphics card	DirectX 9 graphics processor with WDDM driver model 1.0 (Not absolutely necessary; only required for Aero)	
HDD free space	16 GB of free disk space	20 GB of free disk space
Optical drive	DVD-ROM drive <sup>[121]</sup> (Only to install from DVD-ROM media)	

- Ubuntu 11.10, hardware requirements

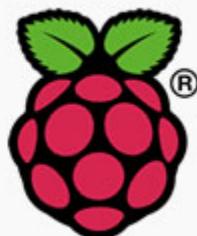
Current Minimum Requirements <sup>[36][37][38][39]</sup>	Server	Desktop
Processor (x86) with the i686 instruction set <sup>[40]</sup>	300 MHz	700 MHz
Memory (RAM)	128 MiB	384 MiB
Hard Drive (free space)	1 GB	5 GB
Monitor Resolution	640×480	1024×768

# ...it can run on very cheap hardware

- raspberry pi ([raspberrypi.org](http://raspberrypi.org)) – cost £4



Raspberry Pi



# What GNU/Linux should I install?

- Get <https://linuxmint.com> (cinnamon edition)
- It can be installed parallel to Windows (dual boot)
- It will make your machine a lot faster
- You'll have a lot more tools available
- You need to burn the ISO on a usb stick or DVD and boot from it. Then follow screen instructions



# Learning the GNU way

- We share code (with appropriate citation)
- We study other people's code!
- We work in pairs in class
- We teach each other how to use tools
- Classes are arranged for collaboration
- Hatchlab vs. studio space



# Sharing but with conditions





**OpenFrameworks**

**Free Software  
Free Society**

# Lab assignment:

- openFrameworks troubleshooting
- compile the emptyExample



A final note...

The impostor syndrome