# Programming for All !

## A problem-based approach

Joachim Wedekind

λSnap! Con

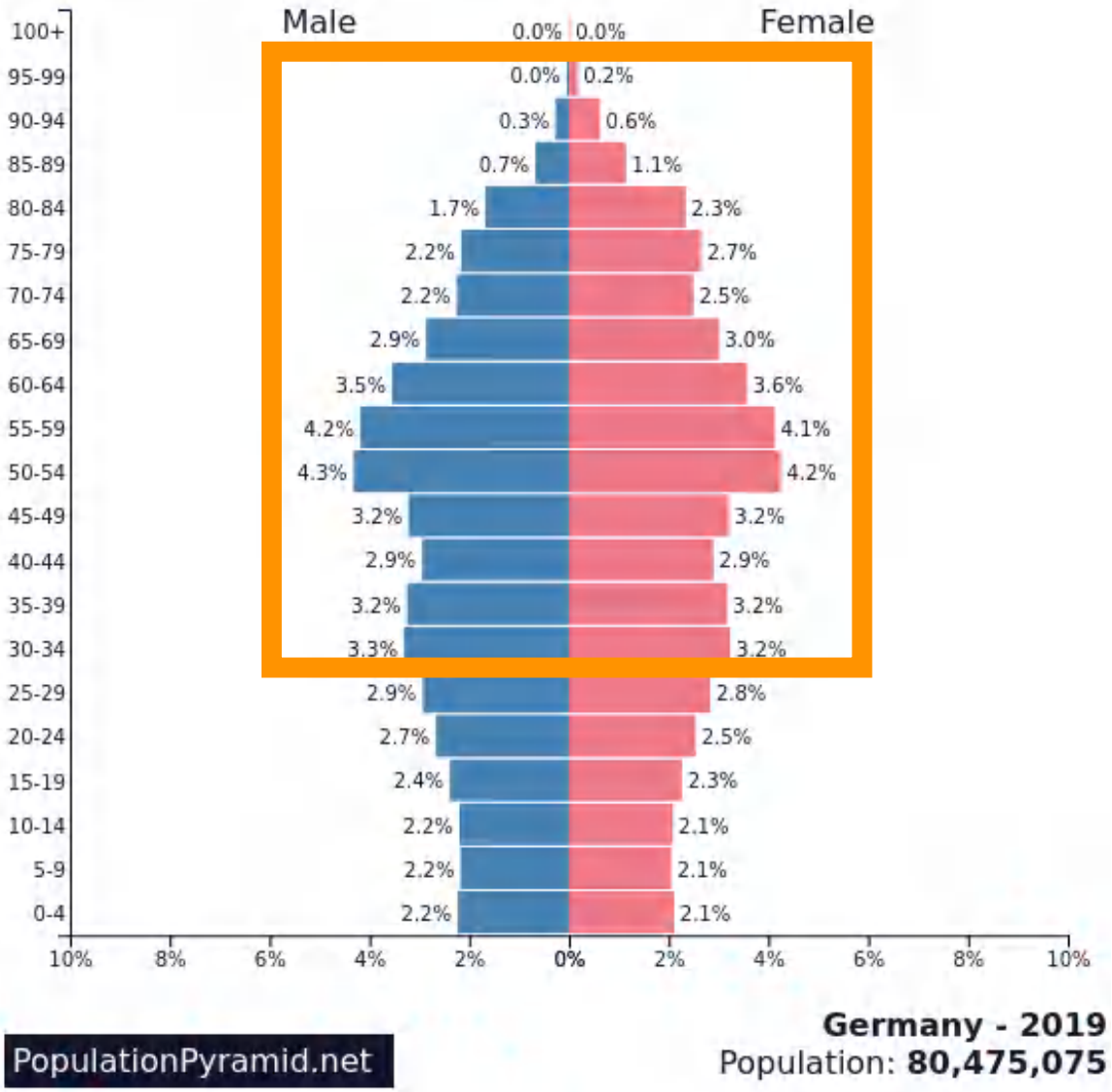
September 24th

Talks 5

?

??

???


Male
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40-44
35-39
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25-29
20-24
15-19
10-14
5-9
0-4
0.0% 0.0%
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0.3% 0.6%
0.7% 1.1%
1.7% 2.3%
2.2% 2.7%
2.2% 2.5%
2.9% 3.0%
3.5% 3.6%
4.2% 4.1%
4.3% 4.2%
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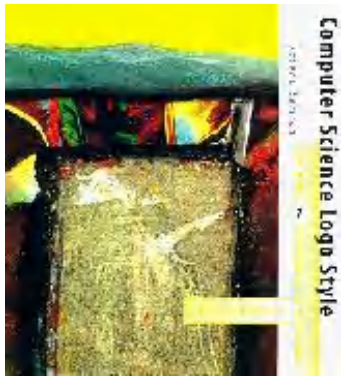
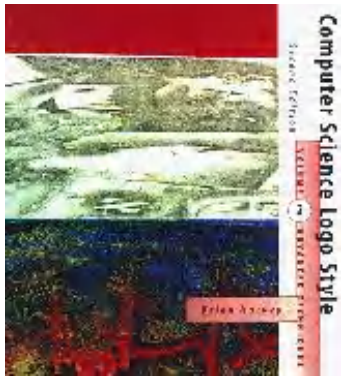
2.9% 2.8%
2.7% 2.5%
2.4% 2.3%
2.2% 2.1%
2.2% 2.1%
2.2% 2.1%
10% 8% 6% 4% 2% 0% 2% 4% 6% 8% 10%
PopulationPyramid.net
Germany - 2019
Population: 80,475,075

Zendler & Spannagel: Zentrale Konzepte im Informatikunterricht: eine empirische Grundlegung



Brian Harvey (1997). Computer Science Logo Style (Vol. 1 - 3)

- Symbolic Computing
- Advanced Techniques
- Beyond Programming

https://bjc.berkeley.edu

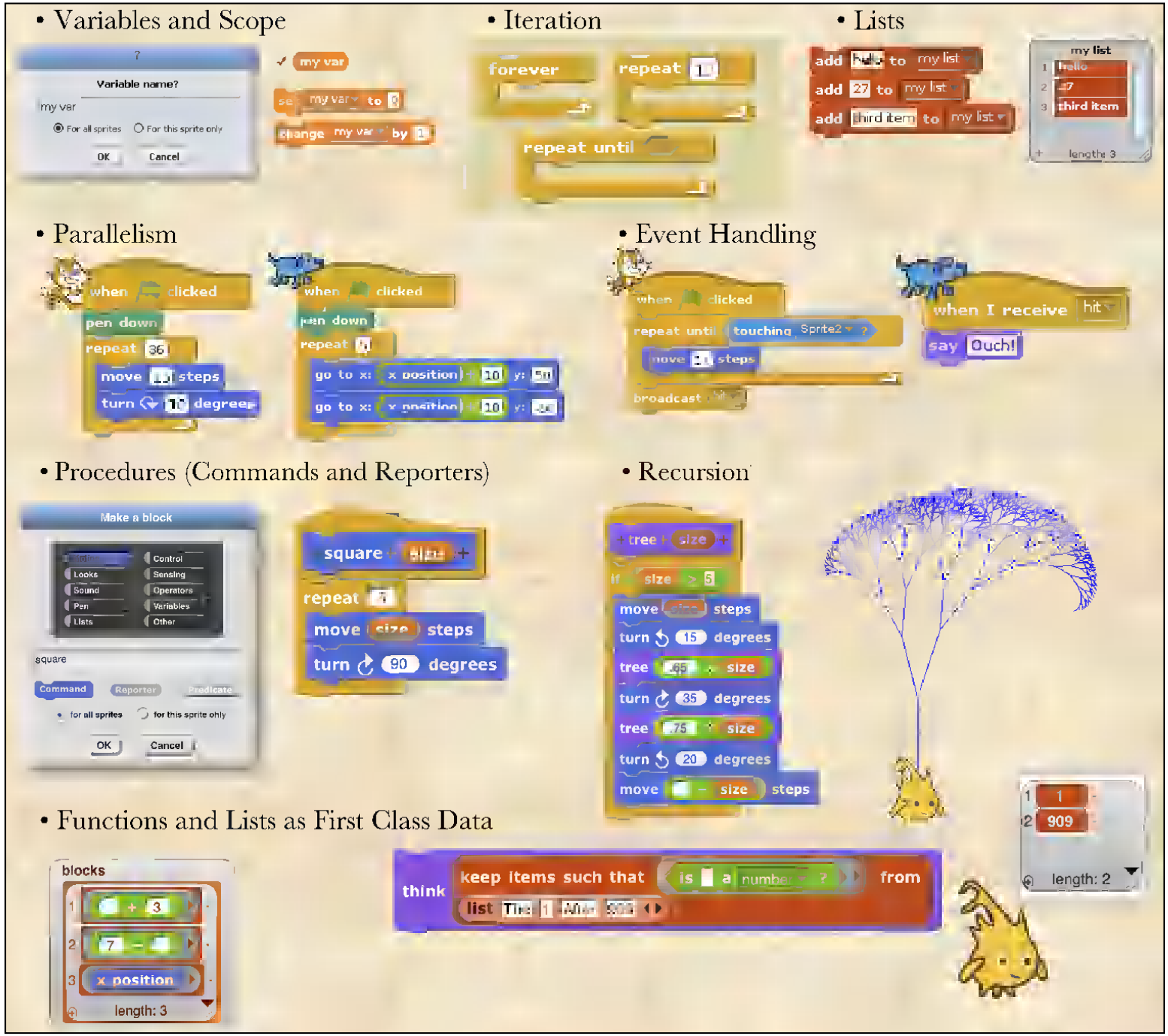
1. Creativity
2. Abstraction
3. Data and Information
4. Algorithms
5. Programming
6. The Internet
7. Global Impact

things to learn

1. Connecting Computing
2. Creating Computational Artifacts
3. Abstracting
4. Analyzing Problems and Artifacts
5. Communicating
6. Collaborating

things to do

# Big Ideas


• Variables and Scope
Variable name?
my var
For all sprites
For this sprite only
OK
Cancel
my var
change my var by 1
• Iteration
forever
repeat 10
repeat until
• Lists
add hello to my list
add 27 to my list
add third item to my list
my list
1 hello
2 27
3 third item
length: 3
• Parallelism
when clicked
pen down
repeat 36
move 10 steps
turn 10 degrees
when clicked
pen down
repeat 4
go to x: x position + 10 y: 50
• Event Handling
when clicked
repeat until touching Sprite2 ?
move 2 steps
broadcast
when I receive hit
say Ouch!
• Procedures (Commands and Reporters)
Make a block
Control
Looks
Sensing
Sound
Operators
Pen
Variables
Lists
Other
square
Command
Reporter
Predicate
for all sprites
for this sprite only
OK
Cancel
square size
repeat 4
move size steps
turn 90 degrees
• Recursion
tree size
if size > 5
move size steps
turn 15 degrees
tree .65 * size
turn 35 degrees
tree .75 * size
turn 20 degrees
move size steps
• Functions and Lists as First Class Data
blocks
1 + 3
2 7 -
3 x position
length: 3
think
keep items such that is a number ? from
list
1
909
length: 2

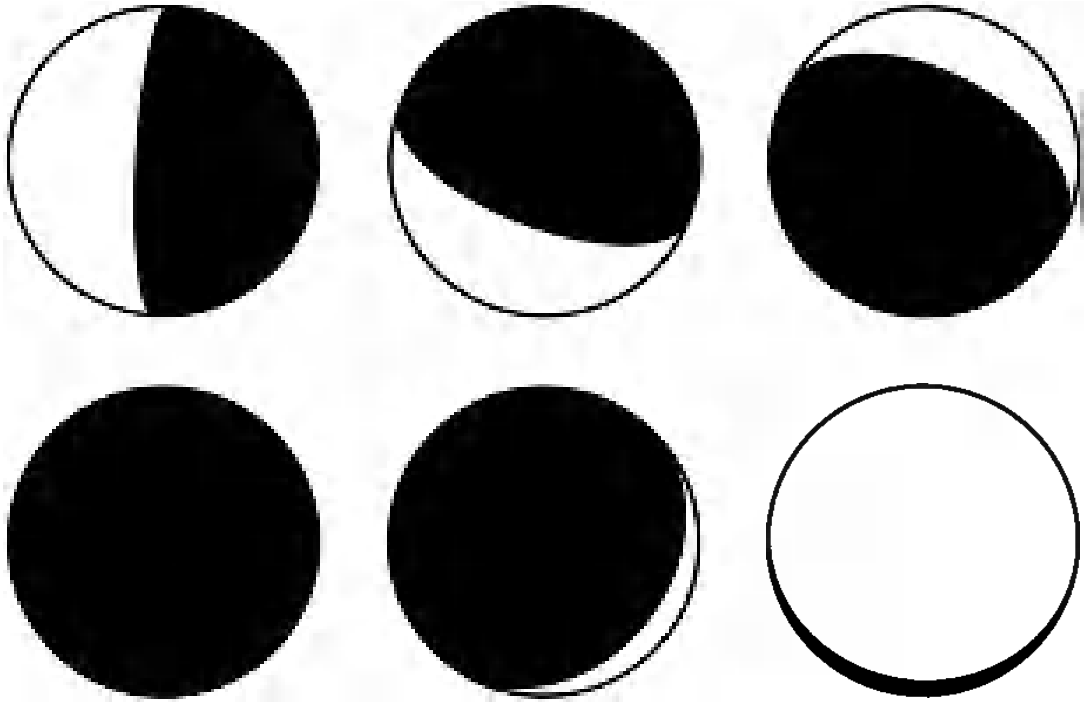
1. personally meaningful artifacts
2. big ideas

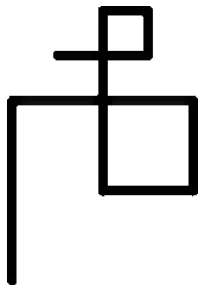
1. personally meaningful artifacts
2. big ideas
3. learning by design
   (planning, implementing, rating & revising)

Lehrer et al. (1994): Learning by Designing Hypermedia Documents

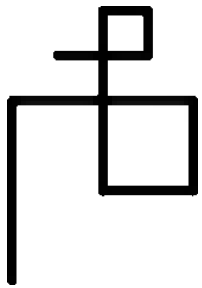
1. computer graphics - animated & interactive
2. one „big idea“ - one product
3. recoding & remixing

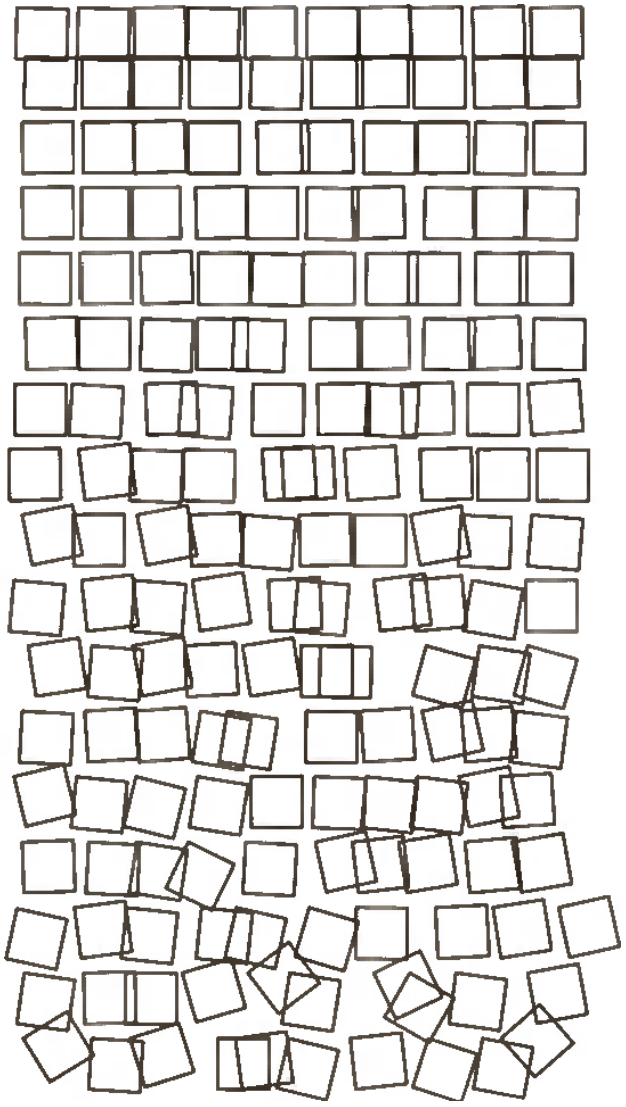
1. computer graphics - animated & interactive



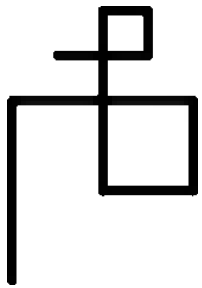


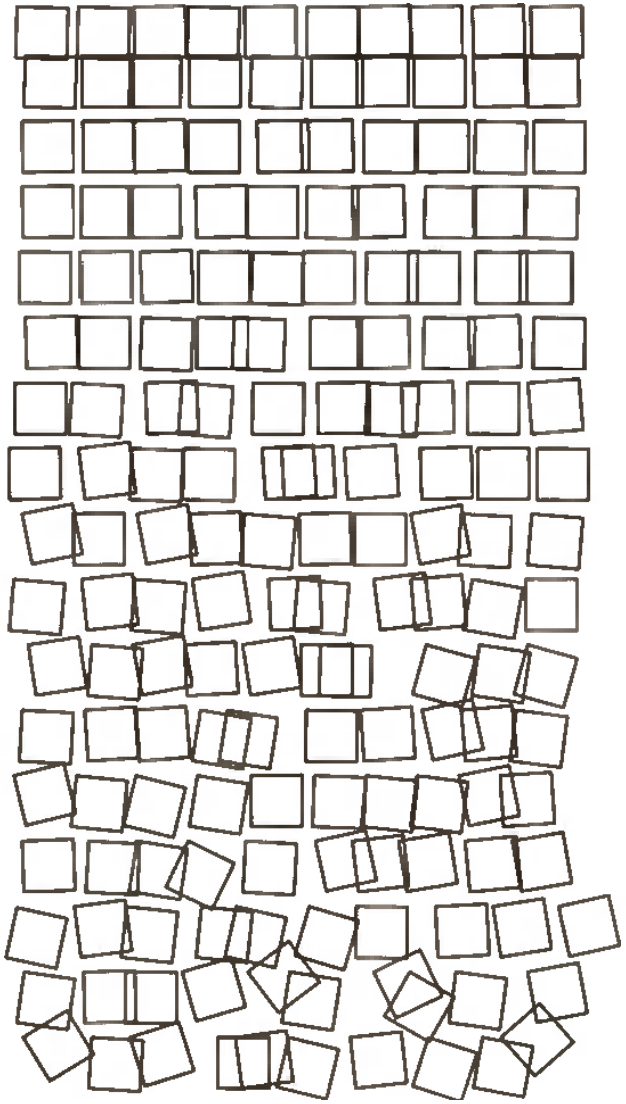
Logo classics Digital art Optical illusions





Logo classics Digital art Optical illusions



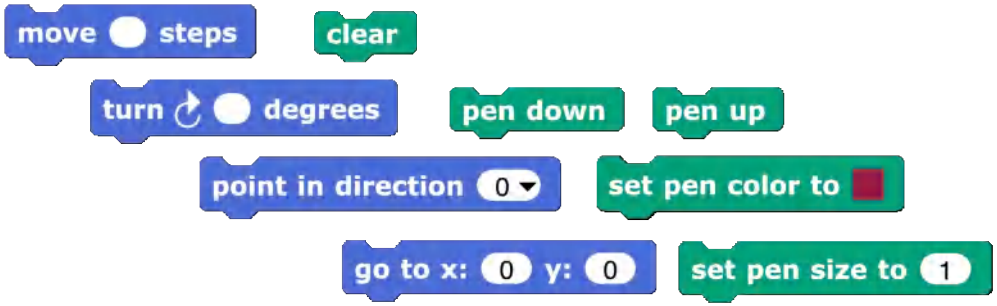


Logo classics

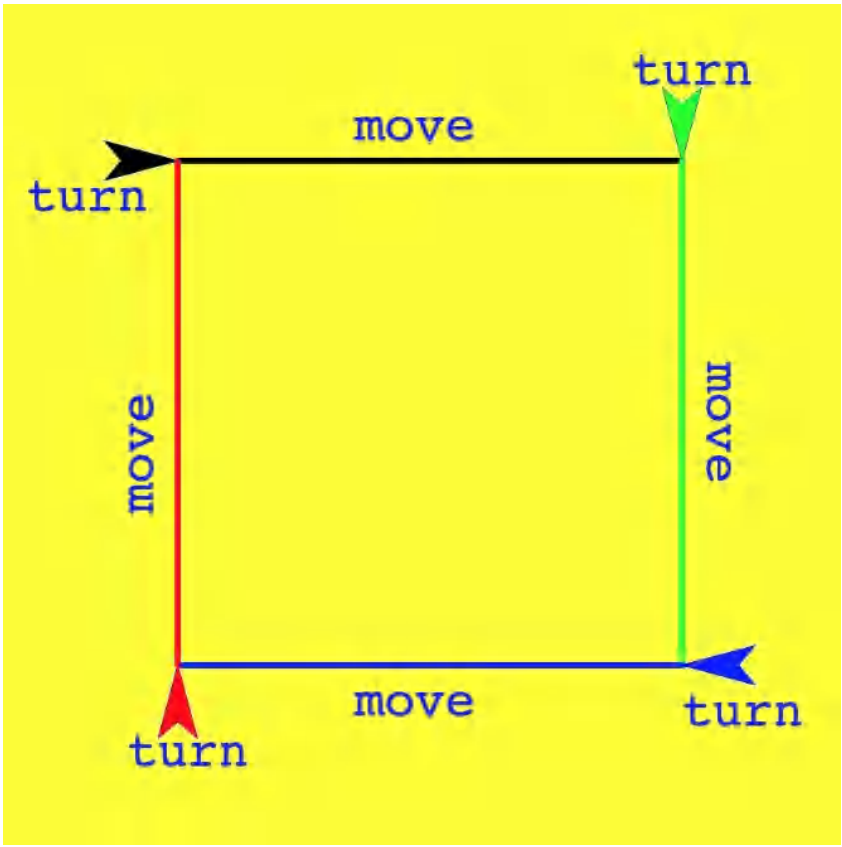
Digital art

Optical illusions

2. one „big idea“ - one product



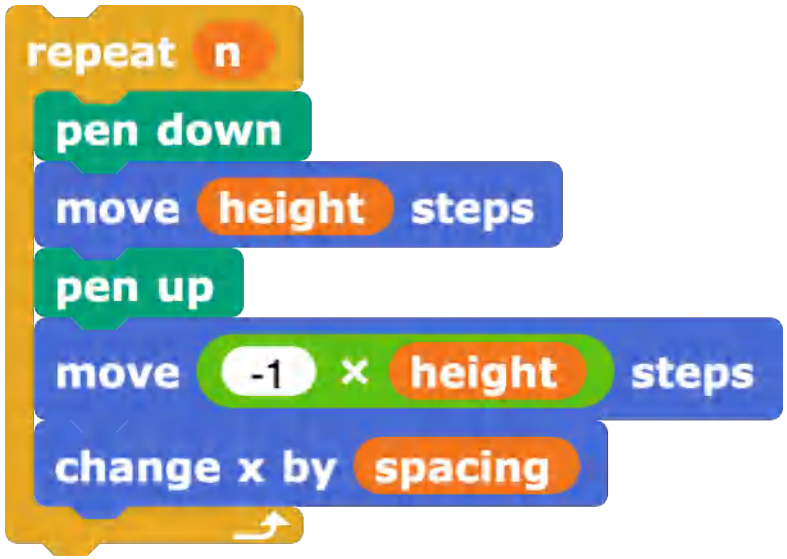

- graphics commands



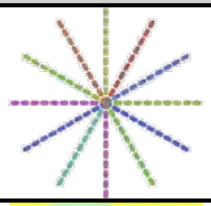
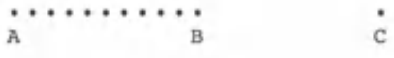
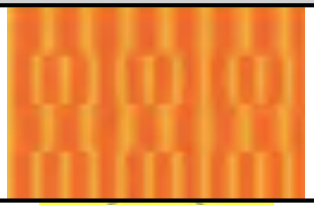
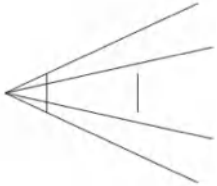
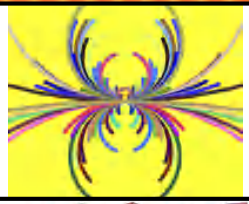
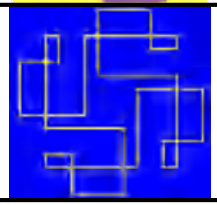
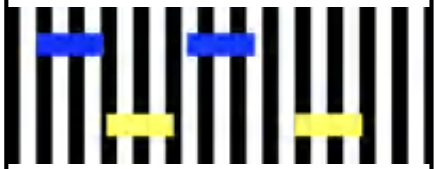
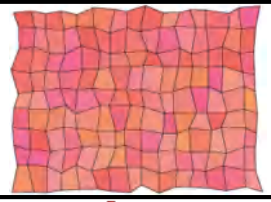
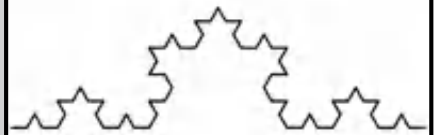
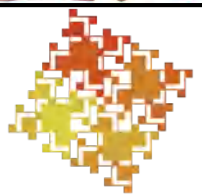
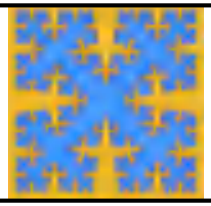
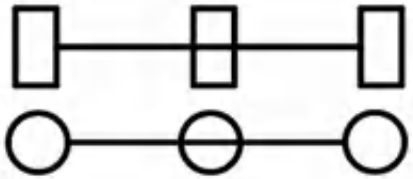
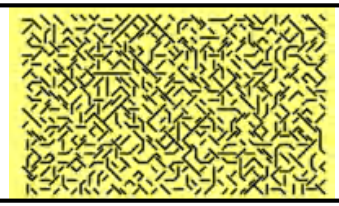
# Oppel-Kundt Illusion

- graphics commands
- iteration

# Oppel-Kundt Illusion



- graphics commands
- iteration
- variables

| | Logo Classics | Opticals | Digital Art |
|---|---|---|---|
| iteration |  |  |  |
| procedures & variables | |  |  |
| lists (of lists) |  |  |  |
| recursion |  | |  |
| procedures as data |  |  |  |

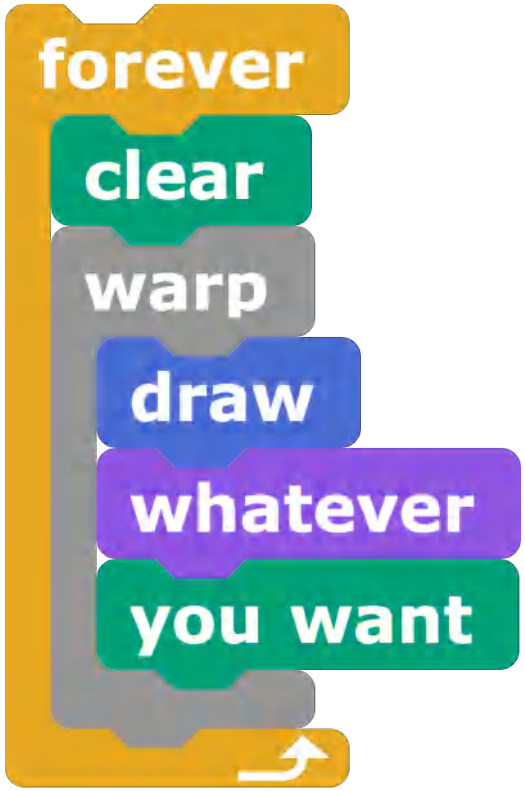
3. learning by design

Think first, code second!

- which graphic elements?
- which will be animated?
- which variables can be changed

Wehrli: Tidying up Art

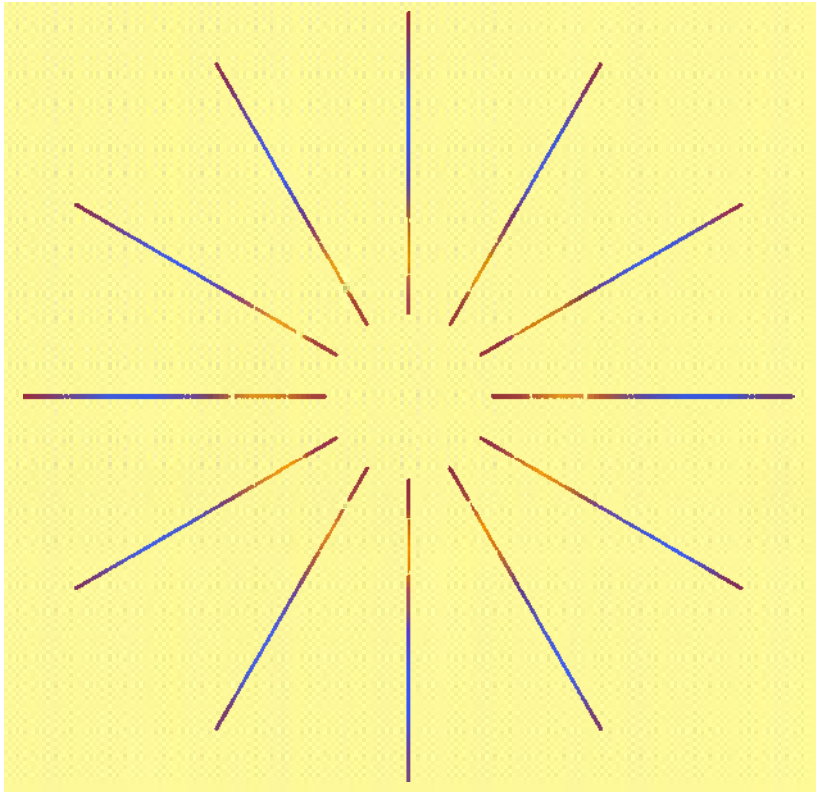
animation



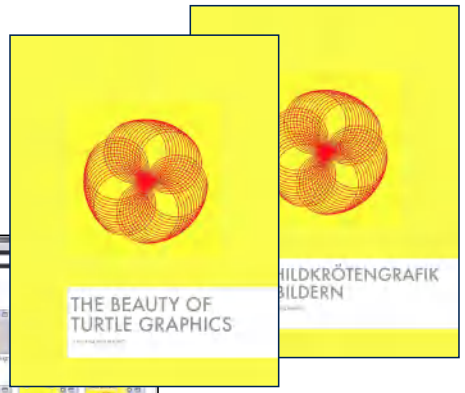

interaction

# Why Snap! ?

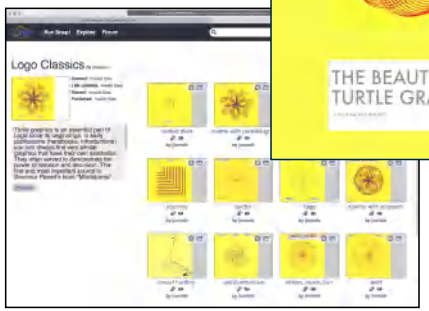
- arbitrary stage sizes
- nested sprites
- sending messages to individual sprites
- blocks libraries
- projects as executables (Snapp!)
- serious applications



- Books: The Beauty of Turtle Graphics

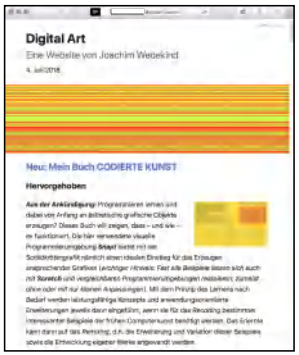



- Website: Logo Classics (Snap!-Cloud)



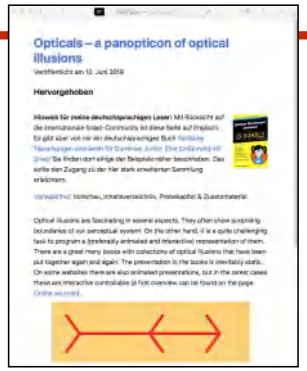

- Book: Codierte Kunst

- Website: Digital Art




- Book: Optische Täuschungen

- Website: Opticals



# Thank you for your attention!

http://digitalart.joachim-wedekind.de
http://opticals.joachim-wedekind.de
https://snap.berkeley.edu/explore (Logo Classics by jowede)

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E-Mail: jo.wede@t-online.de