One Hundred Languages

or the ABC of Technology

www.helloruby.com

Linda Liukas
@lindaliukas

Programmer
Illustrator
Author
Business school
dropout
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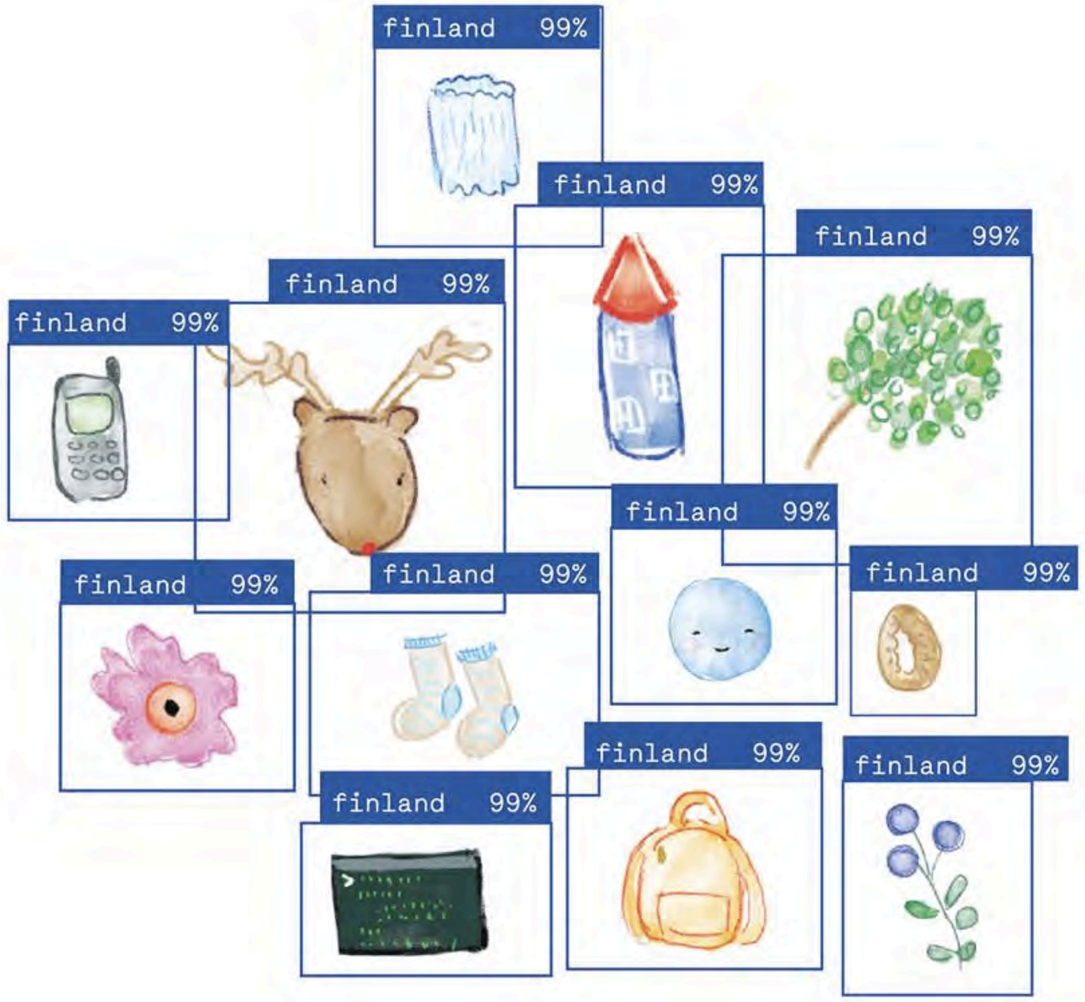
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Finland

Education - equity over excellence. Play & recess time. Minimal testing.

Cooperation
Creativity
Trust-based responsibility
Professionalisation
Equity

"The Finnish Way" - Pasi Sahlberg

Competition
Standardisation
Test-based accountability
Deprofessonialisation
Privatisation

Global Educational Reform Movement

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Finland

From a country of 5 million people unproportionate amount of the software that runs the world. Open source.

Nokia
Linux
Git
IRC
SSH
MySQL

..and the Scandinavian / Baltic region (30 M people):

- *Rails*
- *PHP*
- *Skype*
- *Spotify*

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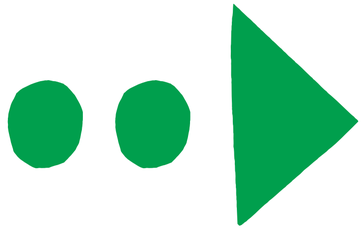
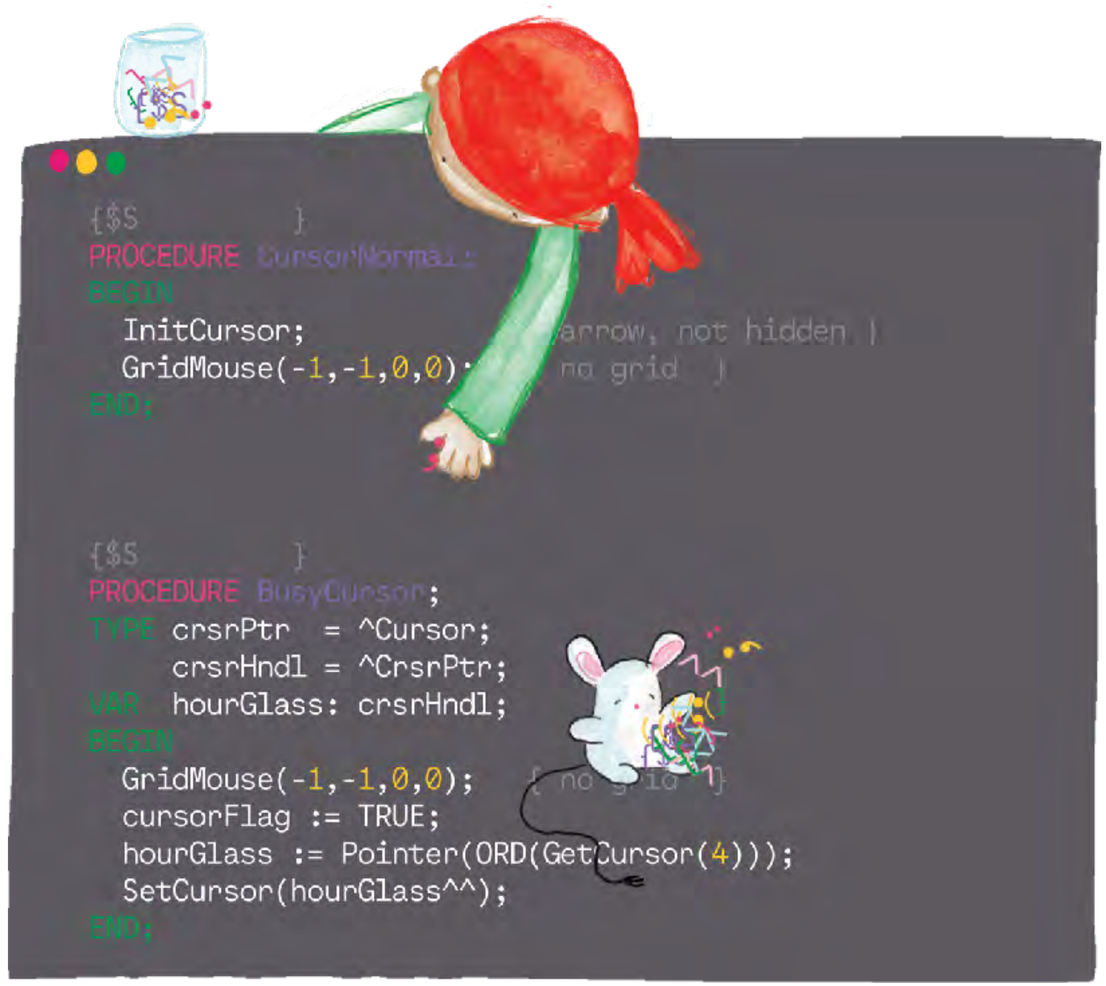
If code is the new lingua franca, instead of grammar classes, we need poetry lessons.



Hi

GAMIFIED TUTORIAL: STEP-BY-STEP INSTRUCTIONS, EASE OF ACCESS

OPEN-ENDED PLAYGROUND: LOW FLOOR, WIDE WALLS, HIGH CEILING



Stories..

..help us make sense of the world.

..connect us to ourselves and to each other.

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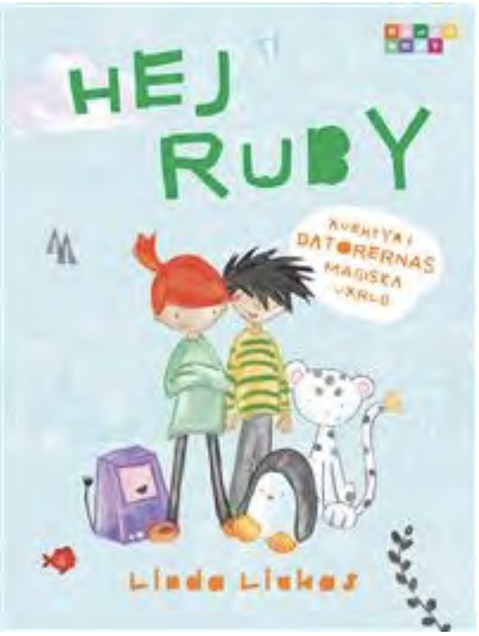
헬로 루비: 코딩이랑 놀자!

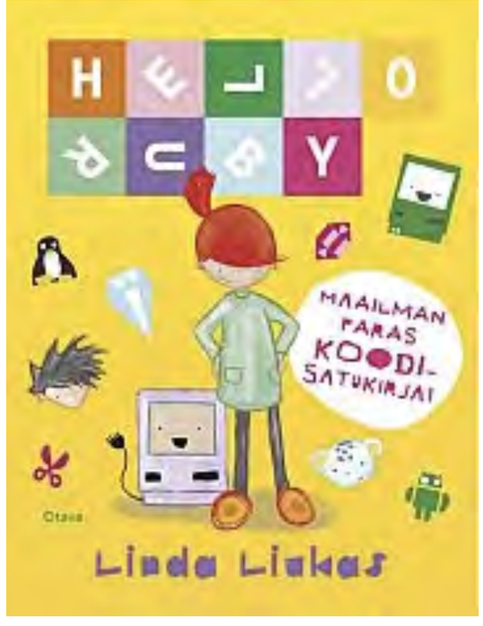
ルビィの ぼうけん
こんにちは! プログラミング
世界中で大反響!
プログラマー的思考法を育む知育絵本

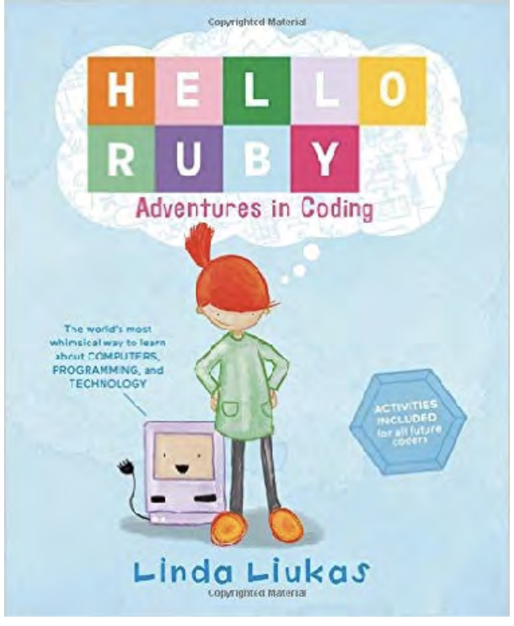
Linda Liukas
À la découverte du codage !
Glénat jeunesse

SVEIKA, RŪBIJ!
AIZRAUJOŠI UZDEVUMI VISIEM TOPOŠAJIEM PROGRAMMĒTĀJIEM
Linda Liukasa


HEJ RUBY
Linda Liukas

Een avontuurlijk sprookje over programmeren
Linda Liukas


MAAILMAN PARAS KOODI-SATUKIRJA!
Linda Liukas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Adventures in Coding
The world's most whimsical way to learn about COMPUTERS, PROGRAMMING, and TECHNOLOGY
ACTIVITIES INCLUDED for all future coders
Linda Liukas
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MATKA TIETO-KONEESEEN
Linda Liukas

HELLO RUBY
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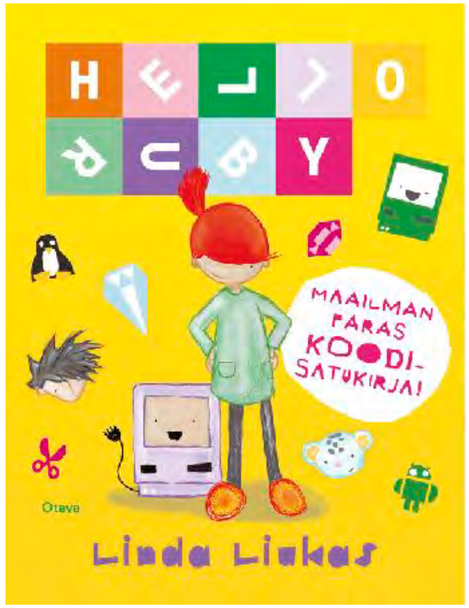
Linda Liukas



A story of a small girl and a big adventure in thinking like a computer.

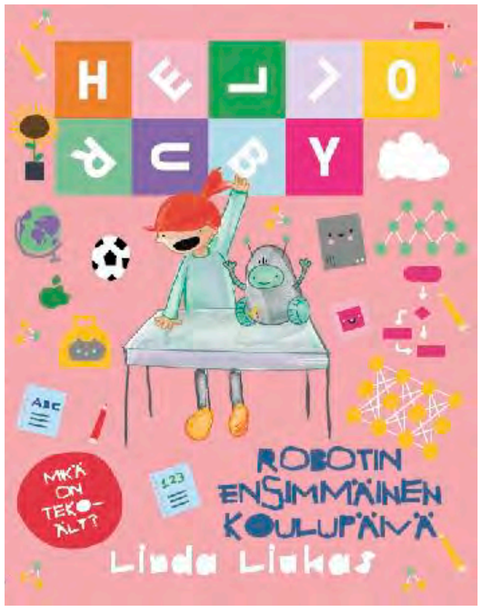
- Computational Thinking
- Decomposition
- Algorithms
- Sequences

A twist on Alice in Wonderland: Ruby falls inside a computer!

- Hardware of computers
- Software of computers
- Input/output
- Sensors
- What are computers?

What if you could build the Internet out of snow?

- Networks and infrastructure
- Hardware of Internet
- Software of Internet
- Applications
- Staying safe online



A modern Pinocchio: Ruby wants to take the robot to school to learn

- AI and Machine Learning
- Computers vs. Humans
- Bias in AI
- What AI can do?

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Preparing kids for a world where so many problems are computer problems.

“Computer Science is no more about computers than astronomy is about telescopes.”
– Dijkstra

what did we learn?

1. Exact commands.
2. In the right order.
3. Naming things is important (and you can't make spelling mistakes)
4. Instructions should cover all scenarios and be modifiable.
5. **Even the biggest problems in the world are just tiny problems stuck together.**

A is for algorithm

START

END

WASH YOUR TEETH

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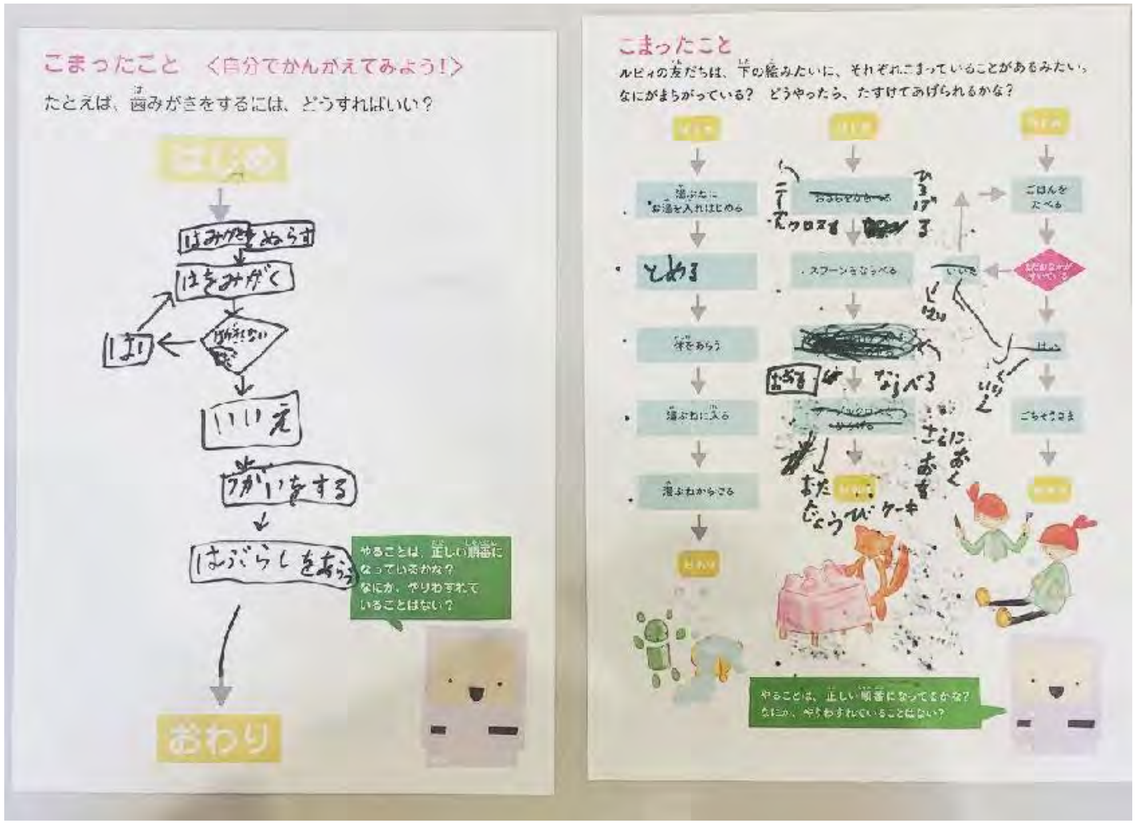
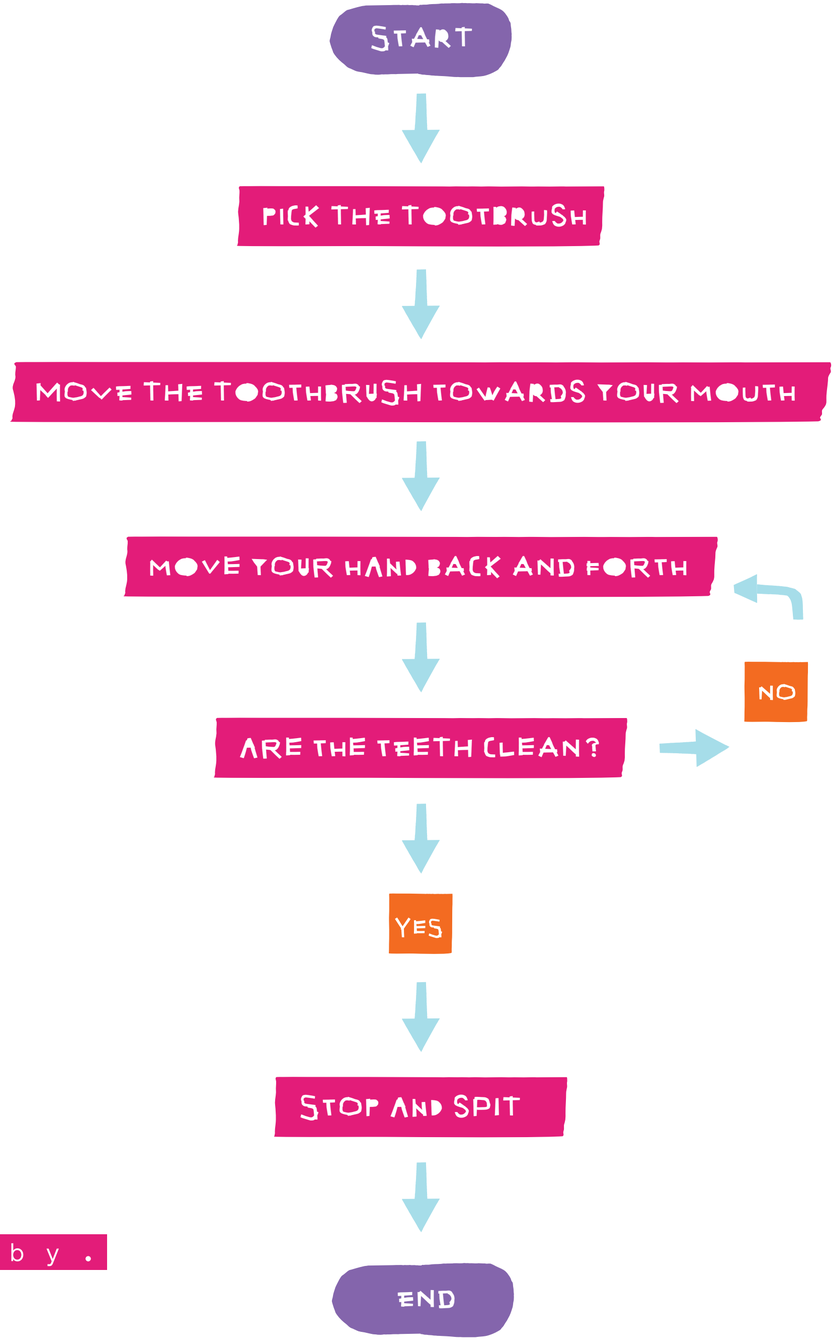

こまったこと　<自分でかんがえてみよう!>
たとえば、歯みがきをするには、どうすればいい？
はみがきをぬらす
はをみがく
はい
いいえ
うがいをする
はぶらしをあらう
おわり
やることは、正しい順番になっているかな？
なにか、やりわすれていることはない？
こまったこと
ルビィの友だちは、下の絵みたいに、それぞれこまっていることがあるみたい。
なにがまちがっている？　どうやったら、たすけてあげられるかな？
とめる
ごはんをたべる
ごちそうさま
やることは、正しい順番になってるかな？
なにか、やりわすれていることはない？

HOW DID IT GO?



... do we know what a toothbrush is?

.. what about the toothpaste?

.. remember to open the toothpaste?

.. remember to stop moving your hand towards the mouth!

.. defining clean

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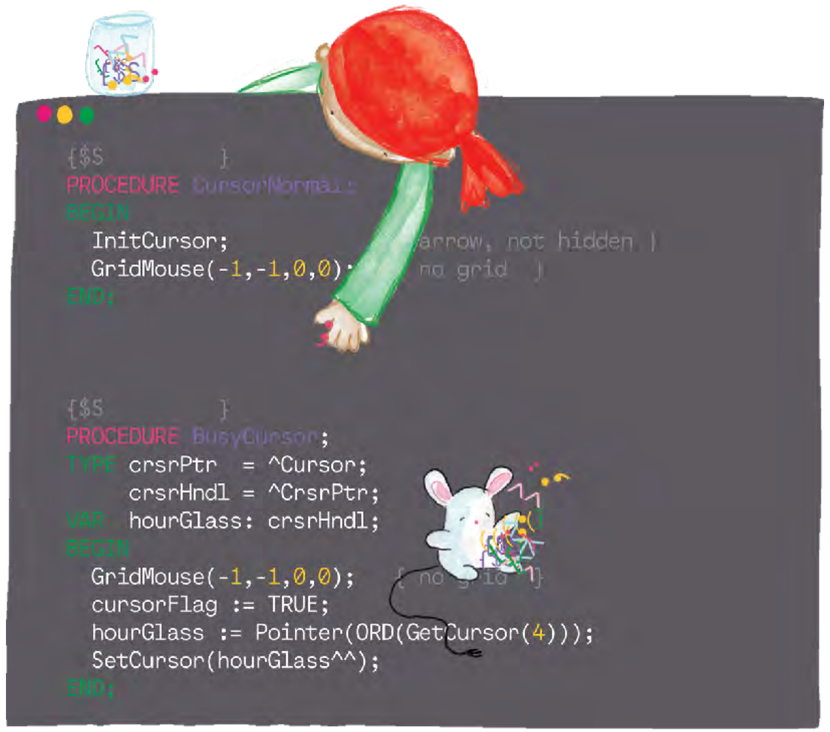
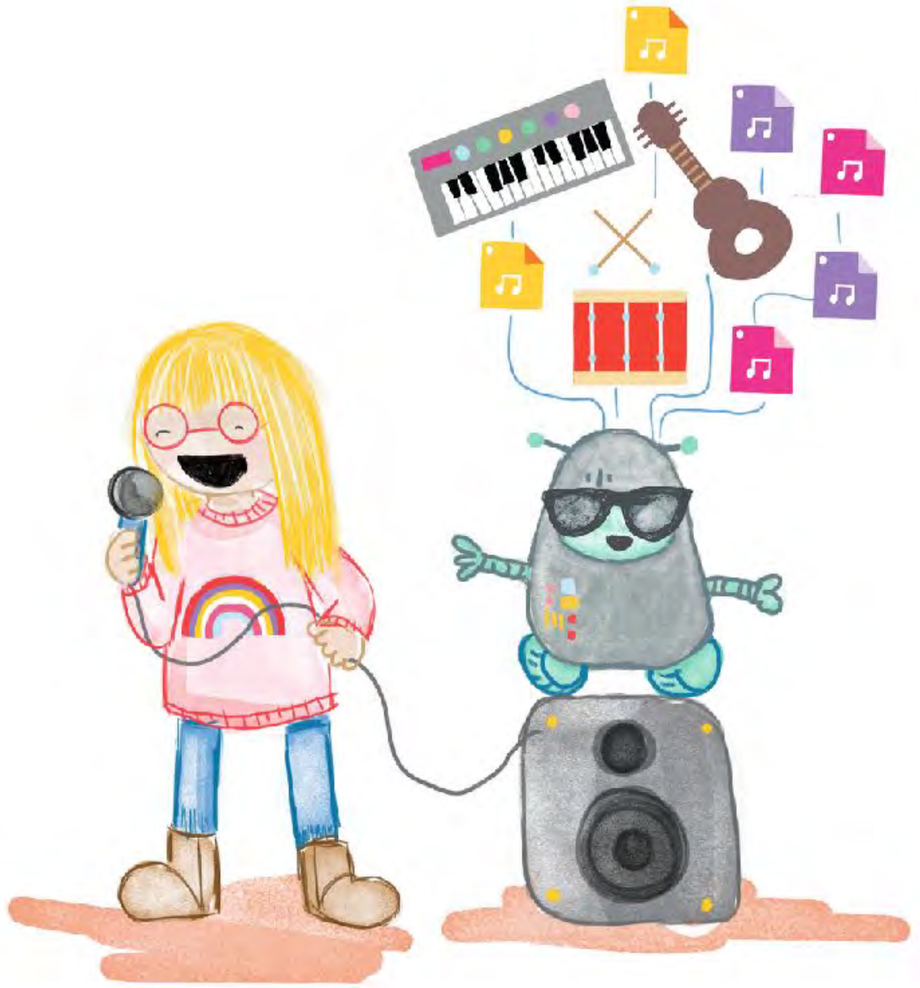
Pair programming

The other one drives, the other one gives instructions.

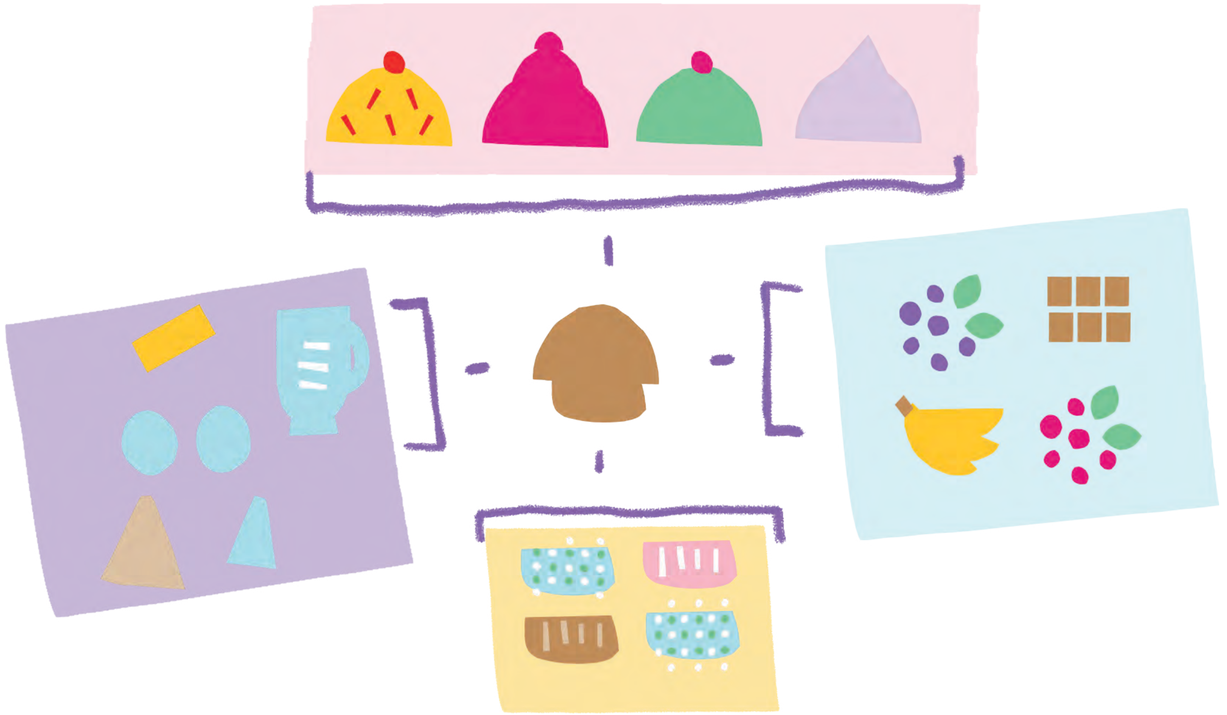


Debugging

1. Explain to three friends what you tried to do before asking teacher.
2. Explain in English. Draw. Act. Talk to a rubber duck.



Creativity



Go right

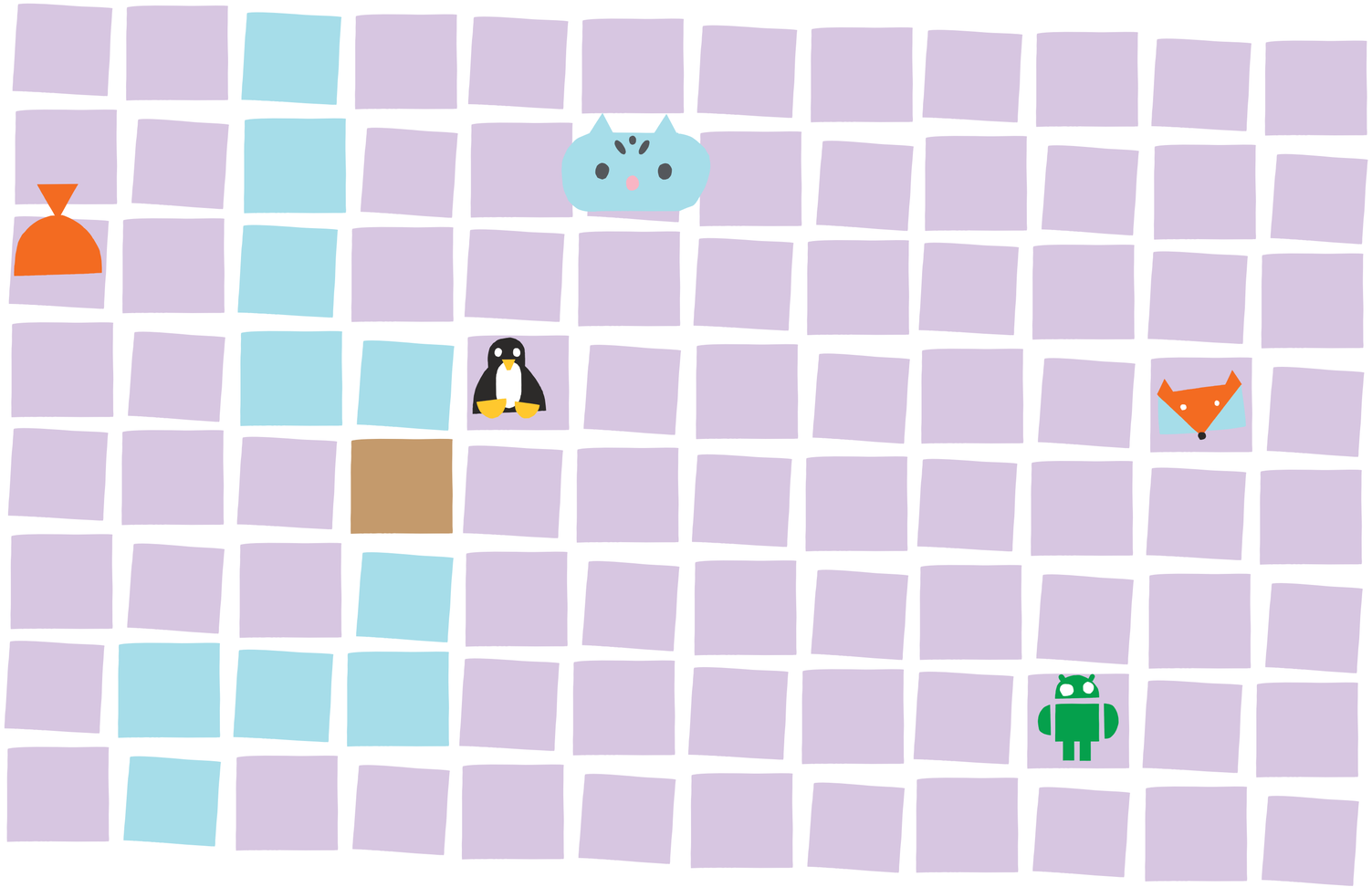
Go left

Go down

Go up

Stop and say hi!

3



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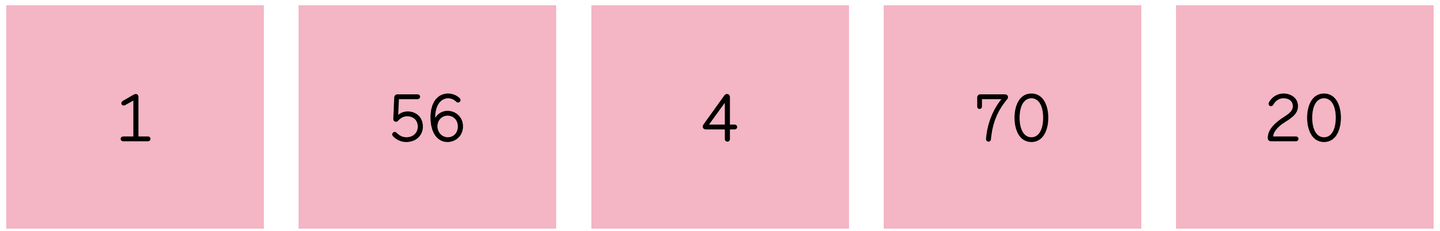
1
56
4
70
20

1	56	8	67	71
78	24	4	33	20
45	81	2	70	10
1	66	98	89	82

	715	1	56	8	67	71	820	71
71	71	455	56	8	67	71	677	712
20	20	78	24	343	433	20	201	20
10	348	45	81	2	470	670	10	10
322	821	1	66	98	89	82	82	82
		71	1	56	435	67	171	71

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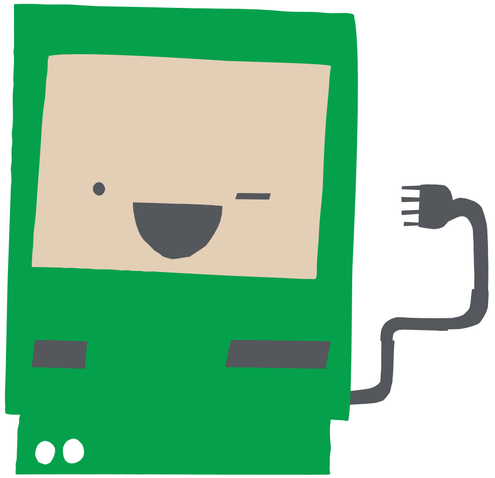
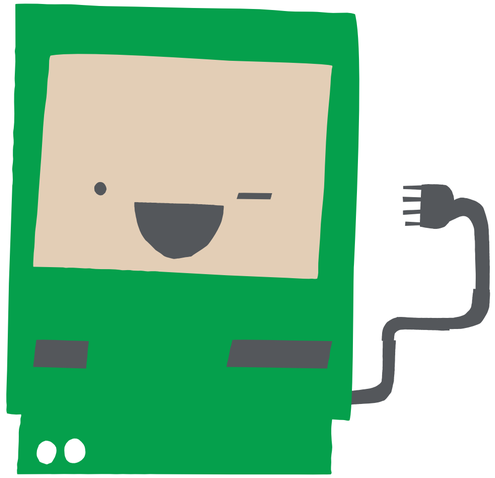
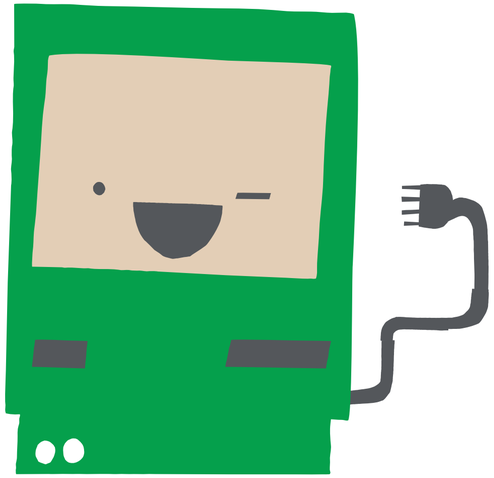


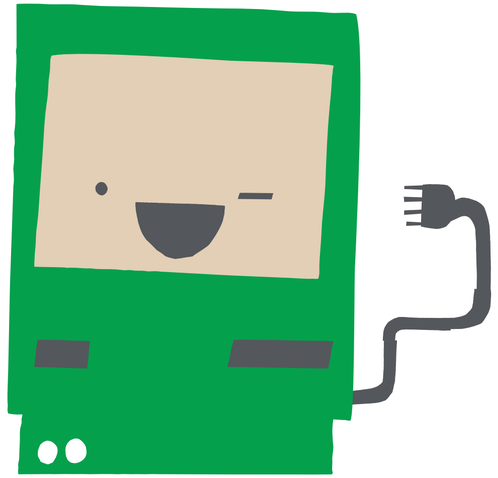
1	56	4	70	20



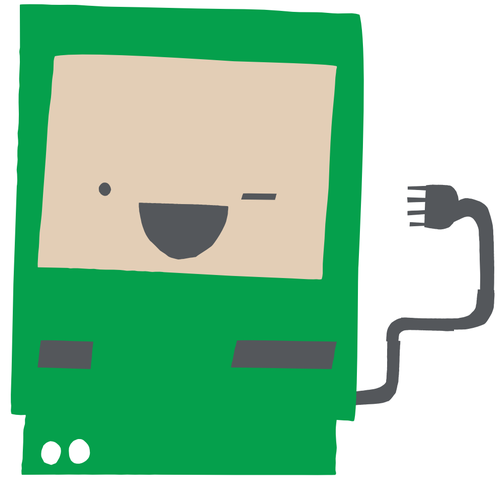
1	56	4	70	20



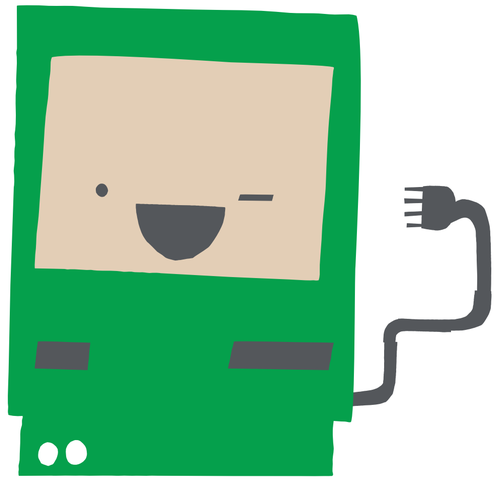
1	4	56	70	20



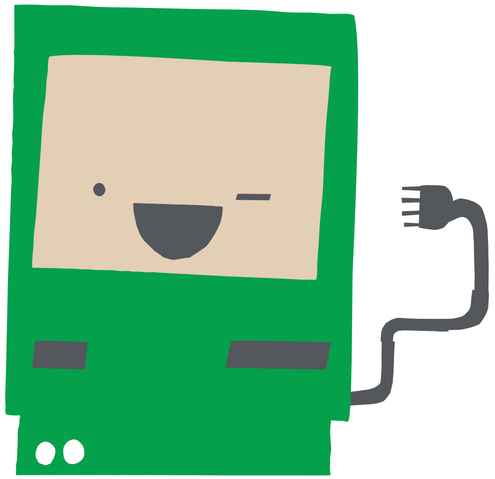
1	4	56	70	20



1	4	56	70	20



1	4	56	20	70



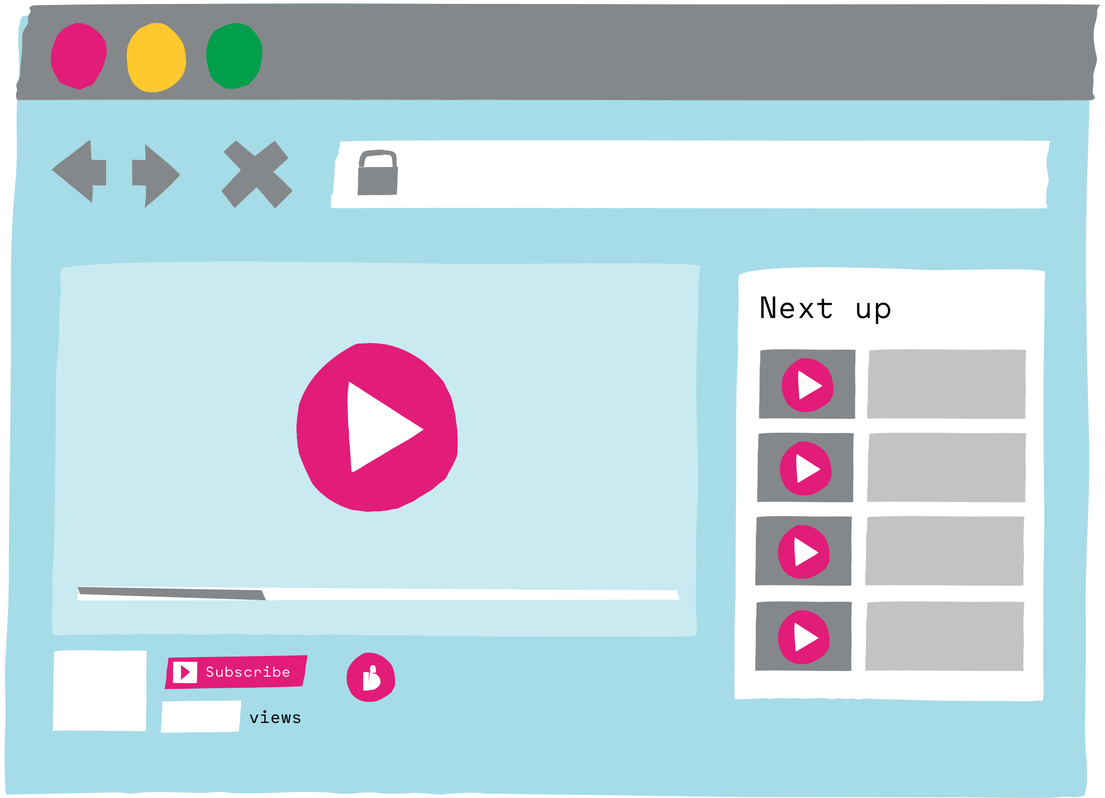
1	4	56	20	70

This is called bubble sort algorithm.

Where is the algorithm?

Where is the algorithm?

Where is the algorithm?



‘Surprise Play Doh Eggs Peppa Pig Stamper Cars Pocoyo Minecraft Smurfs Kinder Play Doh Sparkle Brilho’;

"In most mathematical lessons the whole difference lies in the fact that the student is asked to accept from outside an already **entirely organised intellectual discipline** which he may or may not understand"
- Jean Piaget

"Don't present students with **pre-organised vocabulary and concepts,** but rather provide students with a **learning environment grounded in action.**"
- Jean Piaget

Achievement	Social	Immersion
Advancement: Progress, power, accumulation, status	**Socialising:** Casual chat, helping others, making friends	**Discovery:** Exploration, lore, finding hidden things
Mechanics: Numbers, optimisation, templating, analysis	**Relationships:** Personal, self-disclosure, finding and giving support	**Role playing:** Story line, character history, roles, fantasy
Competition: Challenging others, provocation, domination	**Teamwork:** Collaboration, groups, group achievements	**Customisation:** appearances, accessories, style, color schemes
		Escapism: Relaxation, escape from real life, avoid real life problems

Lego Foundation: Systematic Creativity in the Digital Realm (2012)

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Lego Foundation: Systematic Creativity in the Digital Realm (2012)

How does a loop feel?

Computers are good at repeating tasks. They like performing the same task over and over again until specific criteria are met (or even infinitely if that is what is required). One thing that computers are very bad at, however, is doing anything without being told to do it.

This is one of Ruby's favorite dance routines. Can you dance it to the beat of your favorite song?

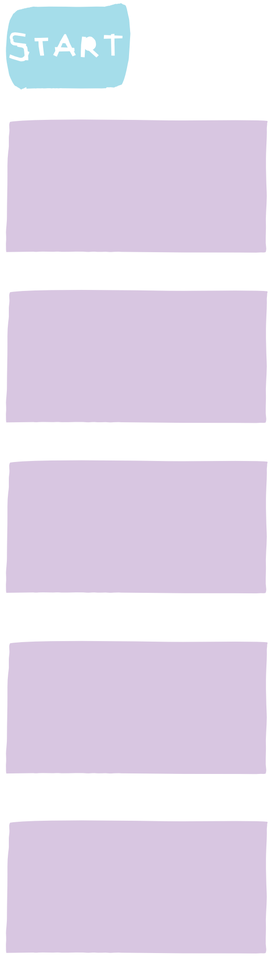
- Clap
- Clap
- Stomp
- Stomp
- Clap
- Clap
- Jump

This is how Snowleopard loves to waltz.

- Swirl
- Jump
- Jump
- Clap
- Clap
- Clap

And this is how the penguins like to boogie.

- Clap
- Kick
- Stomp
- Stomp
- Jump



For loop!
While loop!
Until loop!

a FOR loop

When you know how many times
to repeat something.

Let’s repeat this three times!

a WHILE loop

Makes the loop repeat WHILE the condition is true.

Let’s repeat this code WHILE I’m standing on one leg.

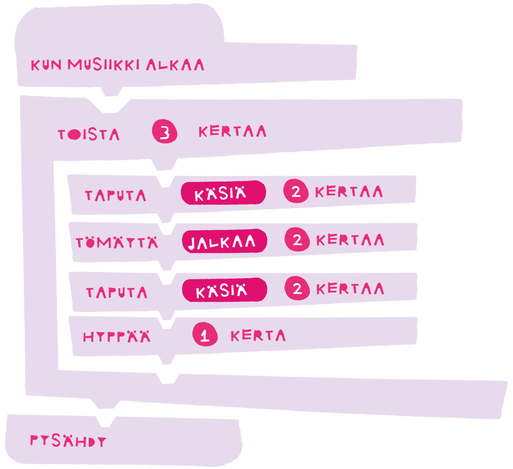
an UNTIL loop

Makes the loop repeat UNTIL the condition is met.

ABSTRACTIONS OF COMPUTING

Kinetic

Visual



Code

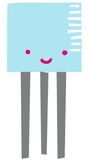
```
for i in 0..1
   puts "Clap"
end

for i in 0..1
   puts "Stomp
end

for i in 0..1
   puts "Clap"
end

puts "Jump"
```

Practice



A thermometer.

A game.

A website.

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Computational thinking

CONCEPTS

Data

Pattern recognition

Logical & critical thinking

Algorithms

Decomposition

Abstraction

PRACTICES

Automation

Persistency

Systems thinking

Tinkering

Collaboration

Debugging

Creativity

Computational thinking

Thinking about problems in a way that allows computers to solve them. Computational thinking is something people do, not computers. It includes logical thinking and the ability to recognise patterns, think with algorithms, decompose a problem, and abstract a problem.

Cross-curricular computing

1 What type of a video are you making?

Silly skit

Fan video

Toy unboxing

Make a how-to

Challenge

My day

My own type

2 Break your video into a storyboard. Draw or write the main idea.

Beginning

How does your video start?

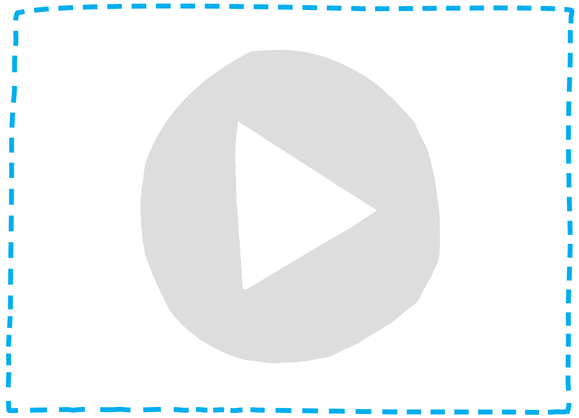
Middle

What happens in the middle?

The End

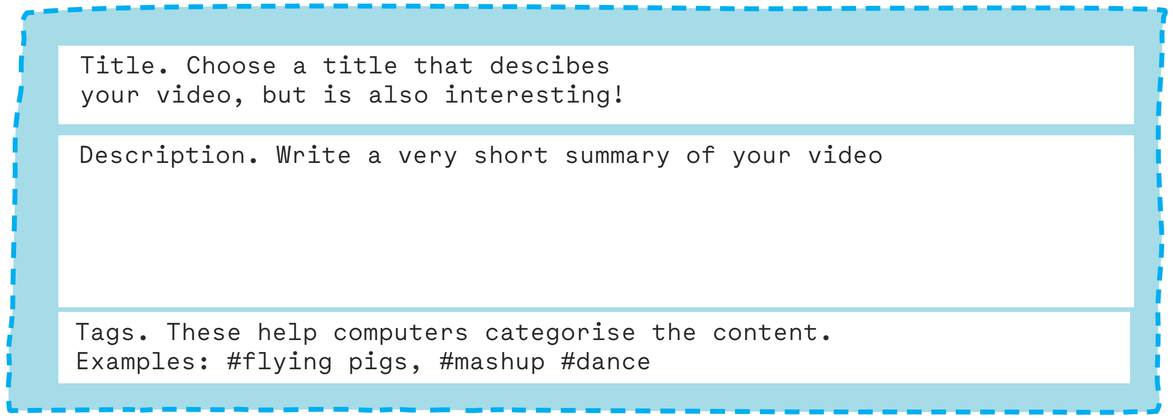
How does your video end?

Prepare. Draw a small preview window of your video and write a title and a short description.



PREVIEW

What kind of image would spark interest of someone on YouTube?



TITLE, DESCRIPTION AND TAGS

4 **Discuss.** There are 400 hours of new vidoes uploaded on YouTube every hour. How can YouTube suggest videos for you to watch next?

The piece of code YouTube uses is called:

Things YouTube looks at for examples:

5 **High five.** Perform the “live video” for your friends and watch others perform. Remember to comment and give thumbs-up to others!

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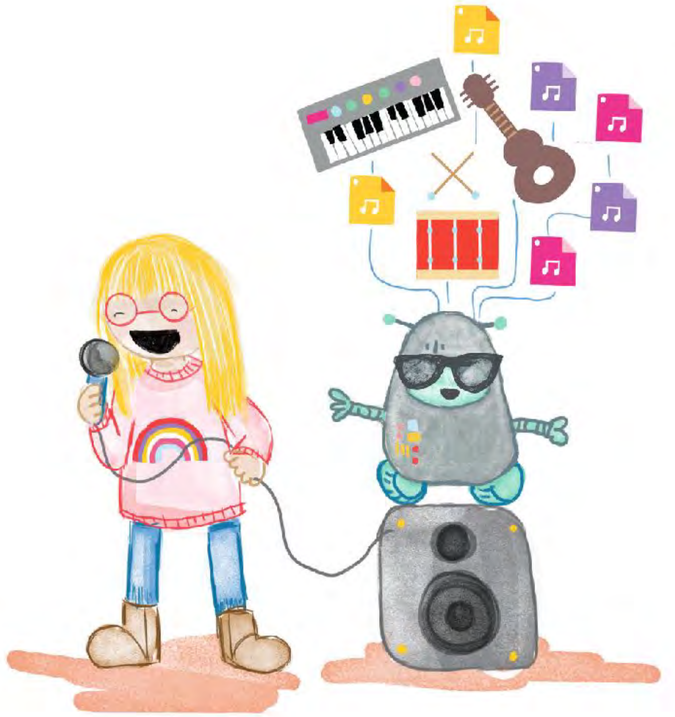
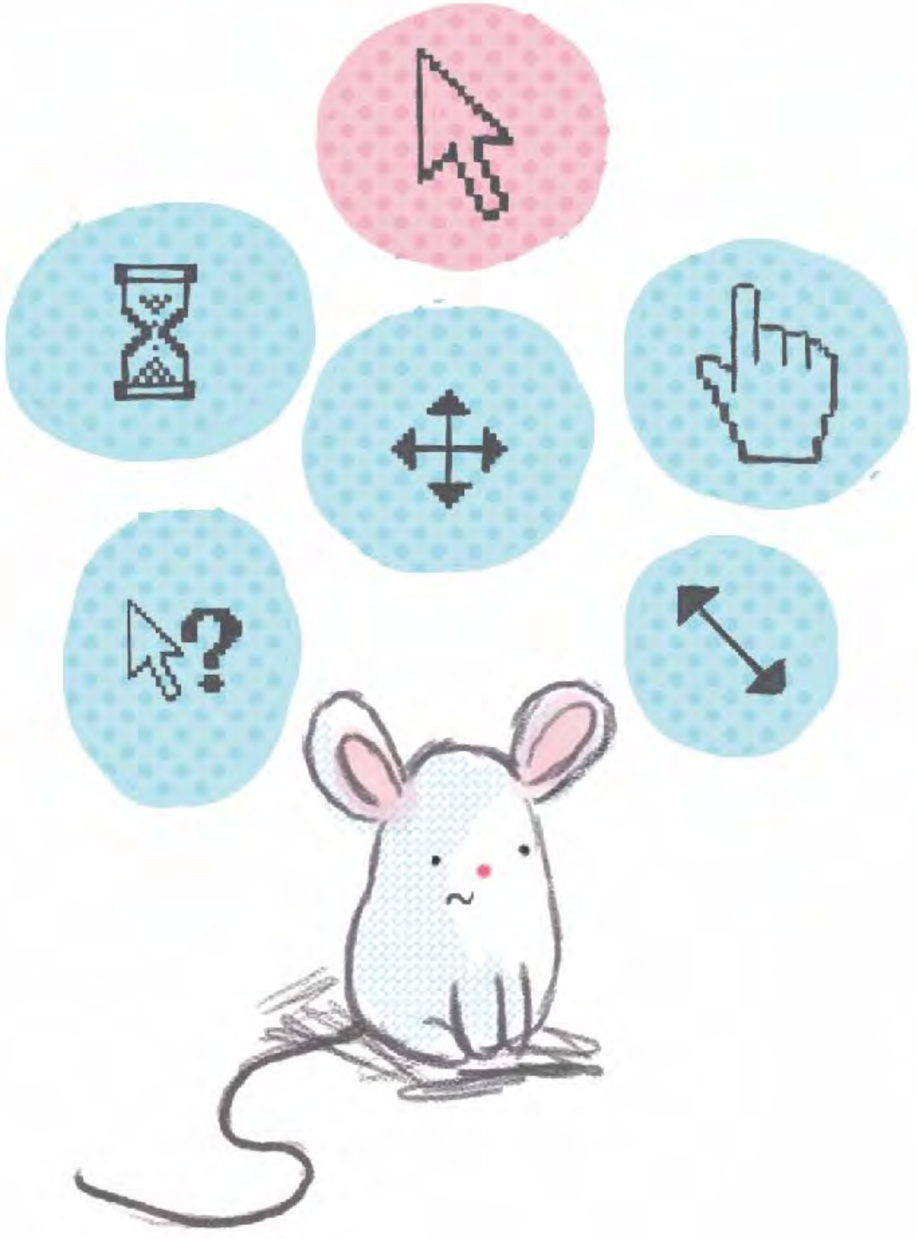
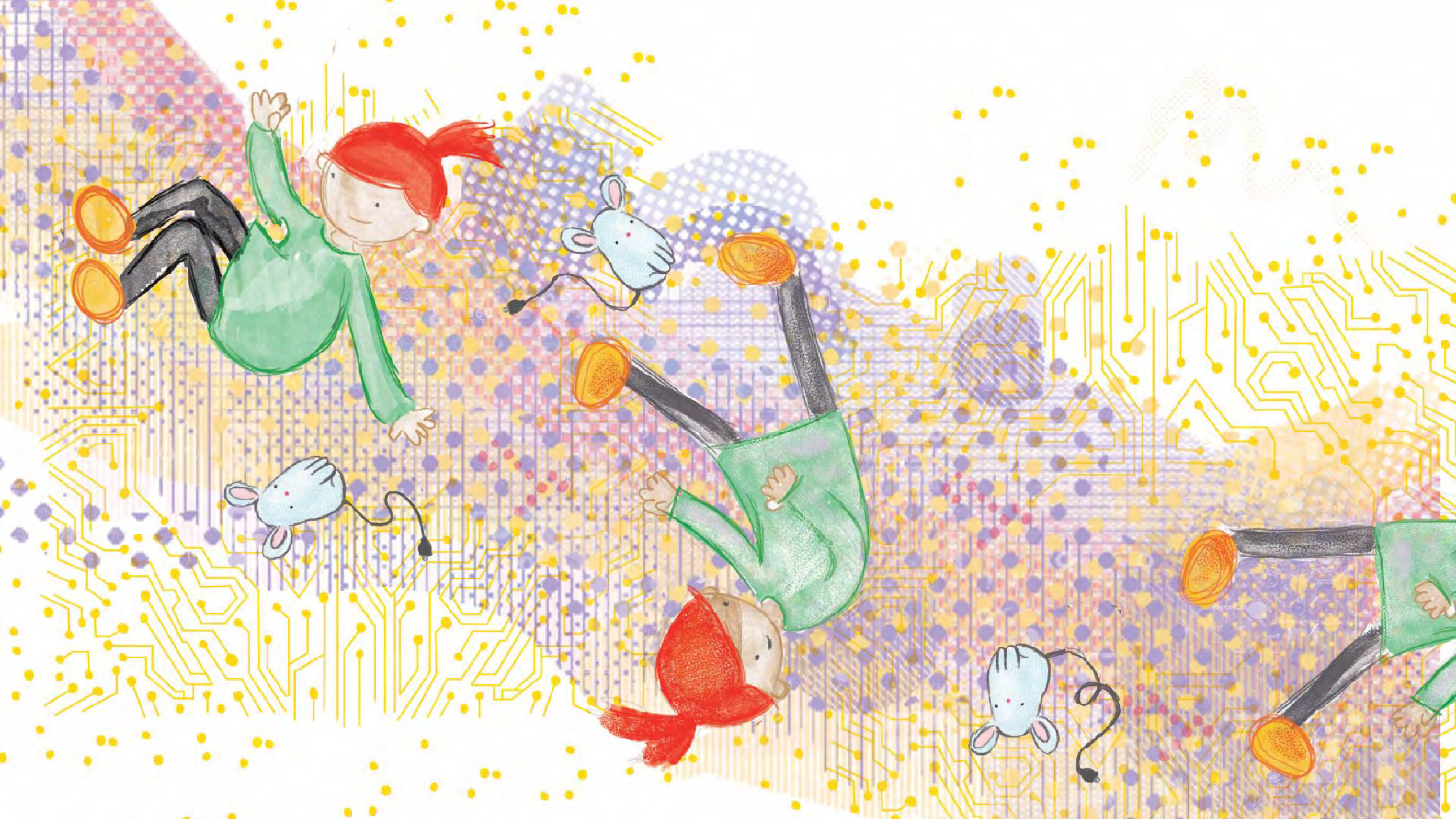
B is for

(boolean) logic



Computers
are
abstraction
machines.





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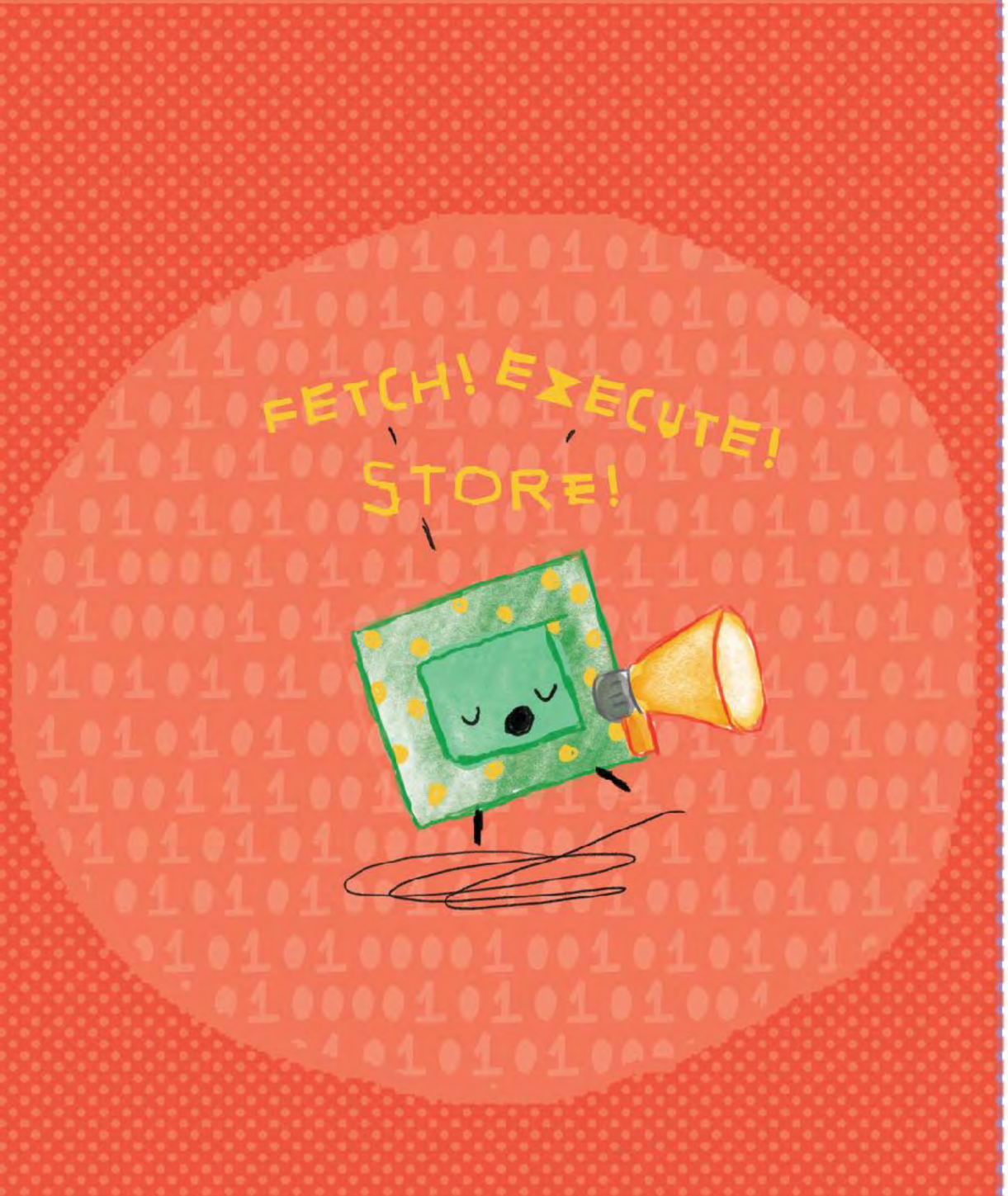
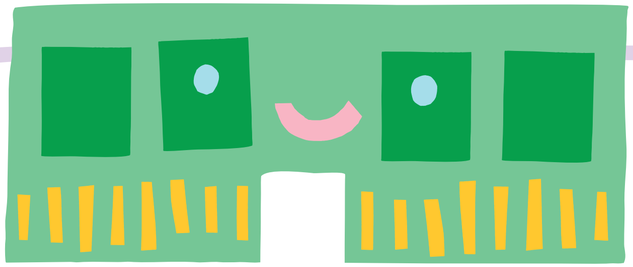

FETCH! EXECUTE!
STORE!

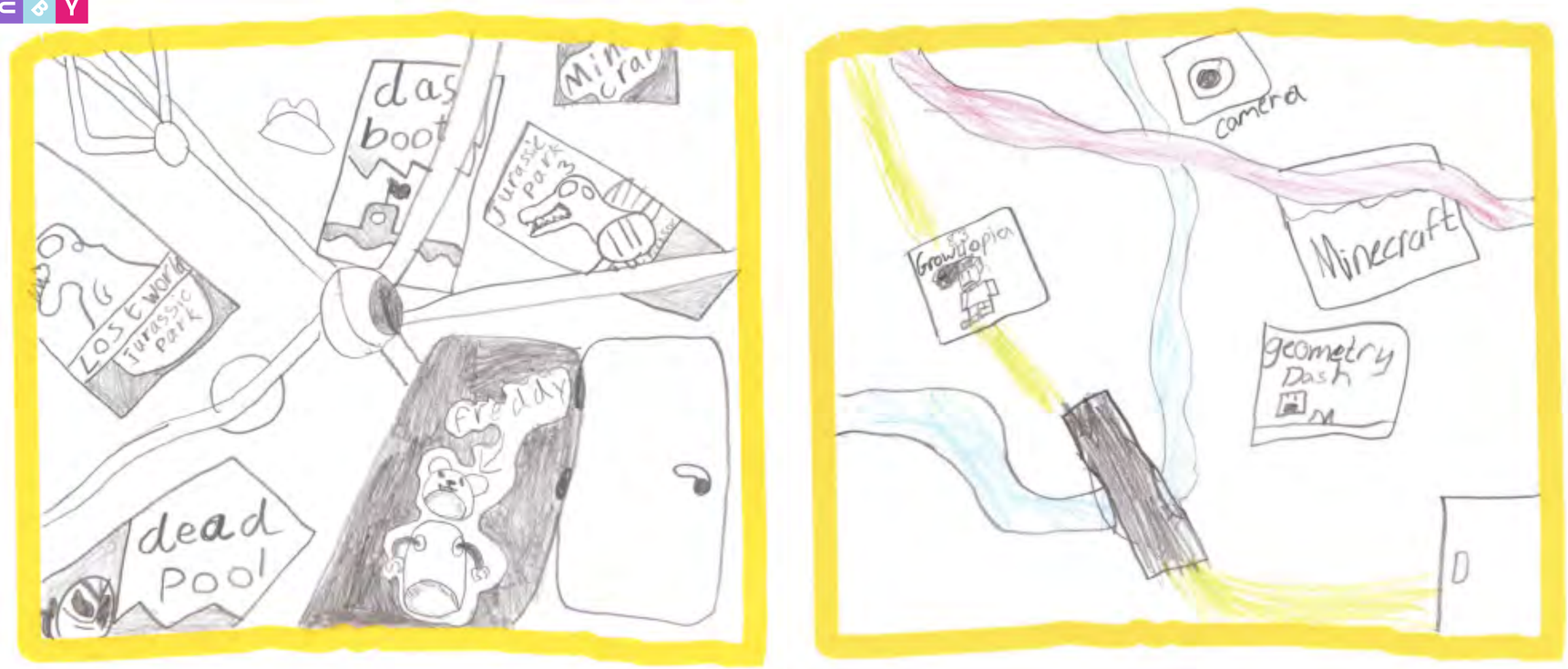
PROCESSOR
PROCESS
INPUT
OUTPUT
MEMORY

MISSING
SUDO
PROCESSOR
DEVICES
SECURITY
MEMORY
FILES
UTILITIES
HARDWARE
SOFTWARE

Computers
are
abstraction
machines.

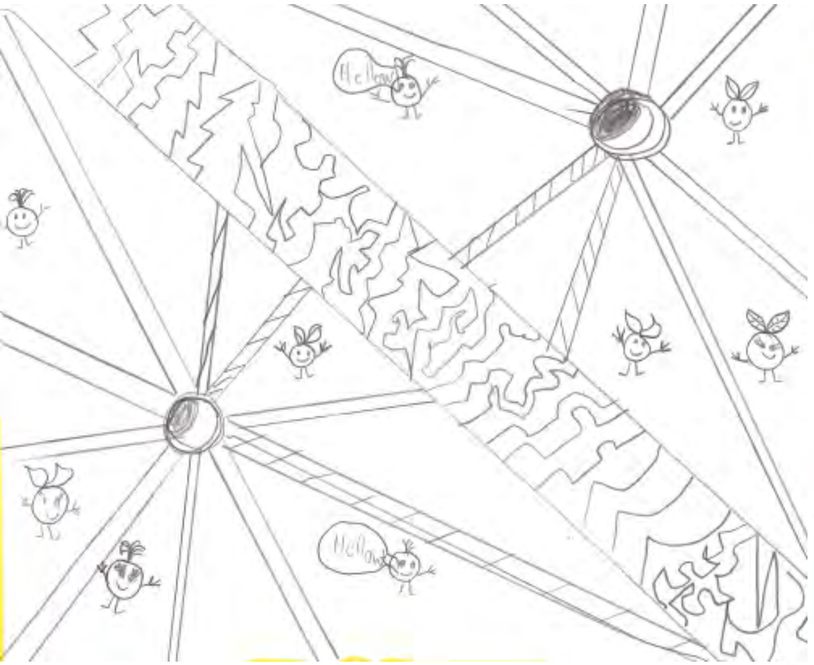
WHAT IS INSIDE A COMPUTER?

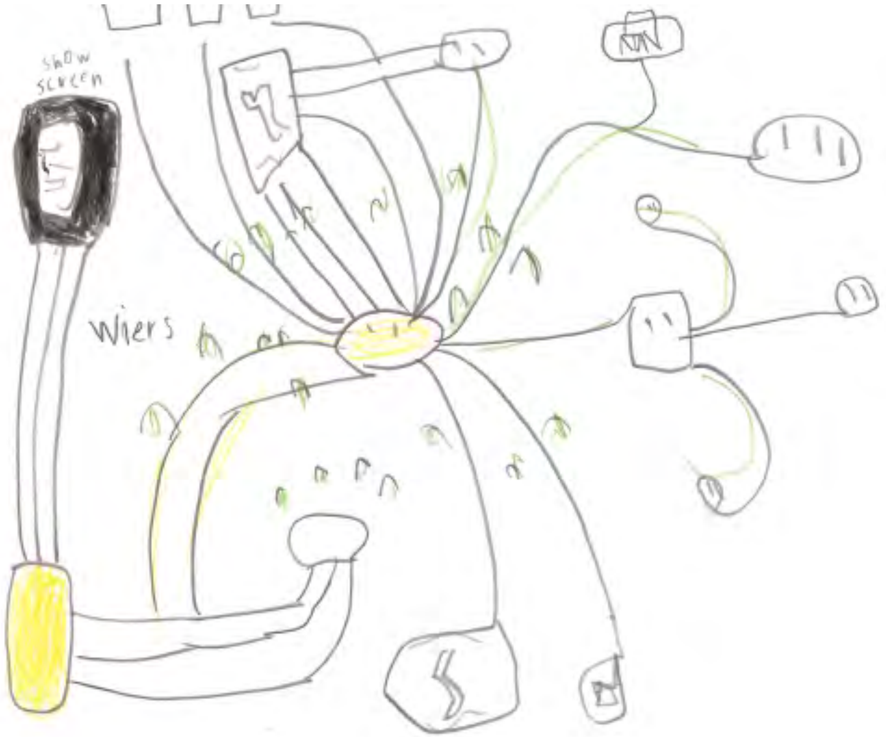


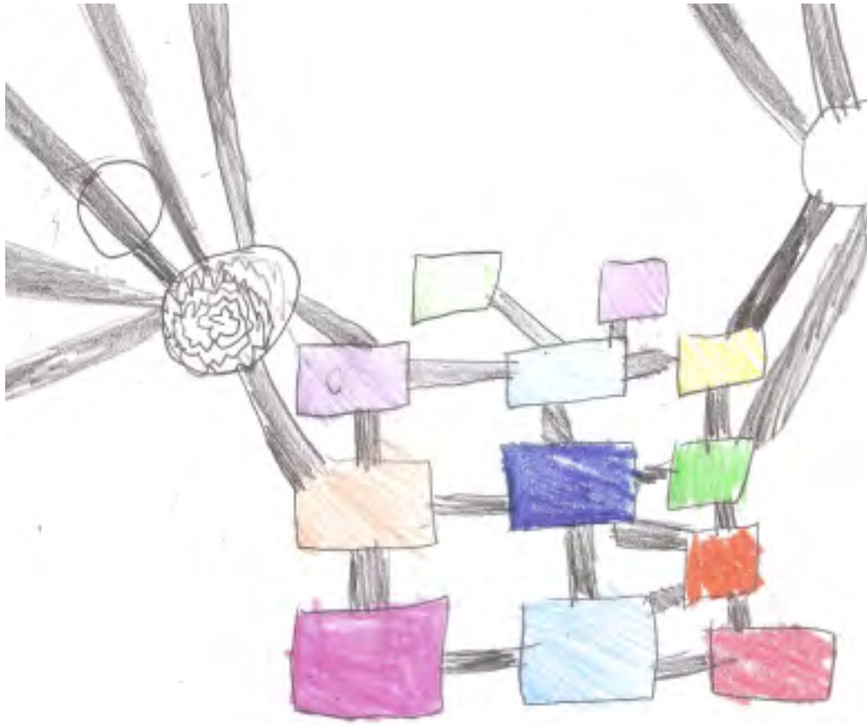


The Content Creators

Kids drawing their apps, games, camera, and files within.
A computer is a concrete place to hold your things inside of.

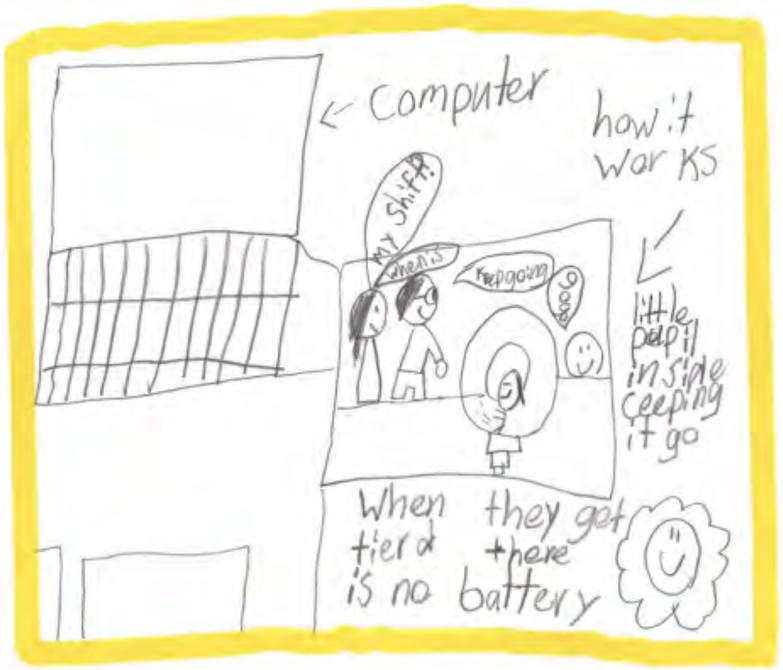






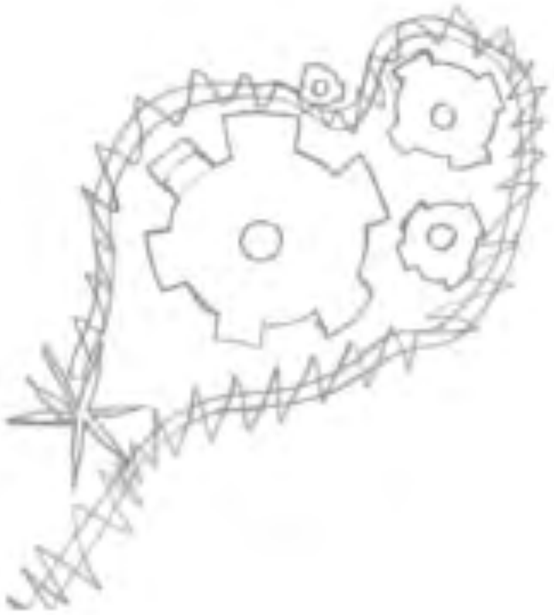
The Linkers

Drawings that expressed connected parts, components, networks and elements by abstract drawings of wire connections and boxes linked with lines.



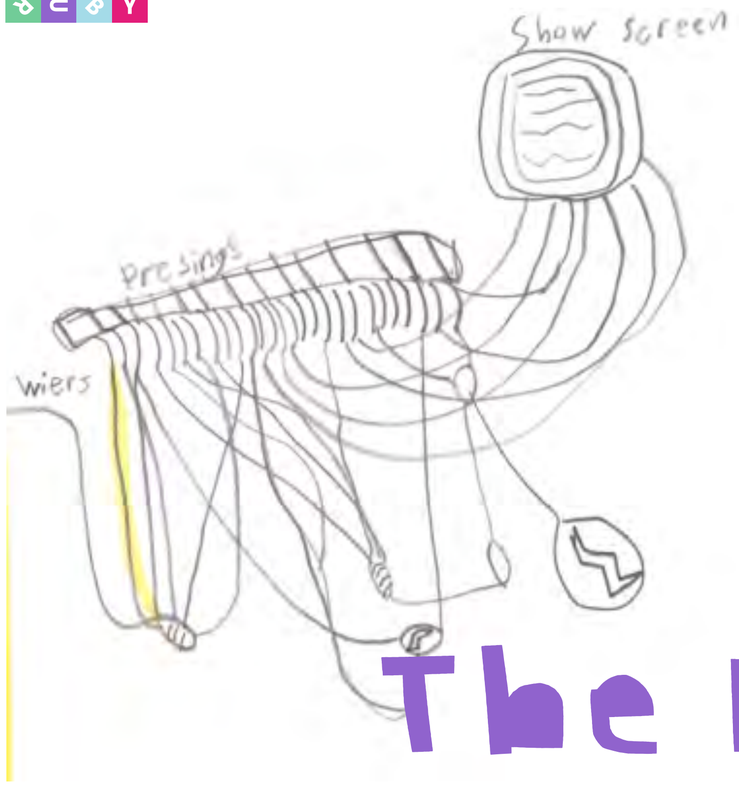
The Scenographers

The scenographer -kids took the computer to the theatre stage. Carrying out functions was also a popular drawing theme, with some of the kids noting that people or bugs physically carry out functions from one part of the computer to the other.



The Gear Gurus

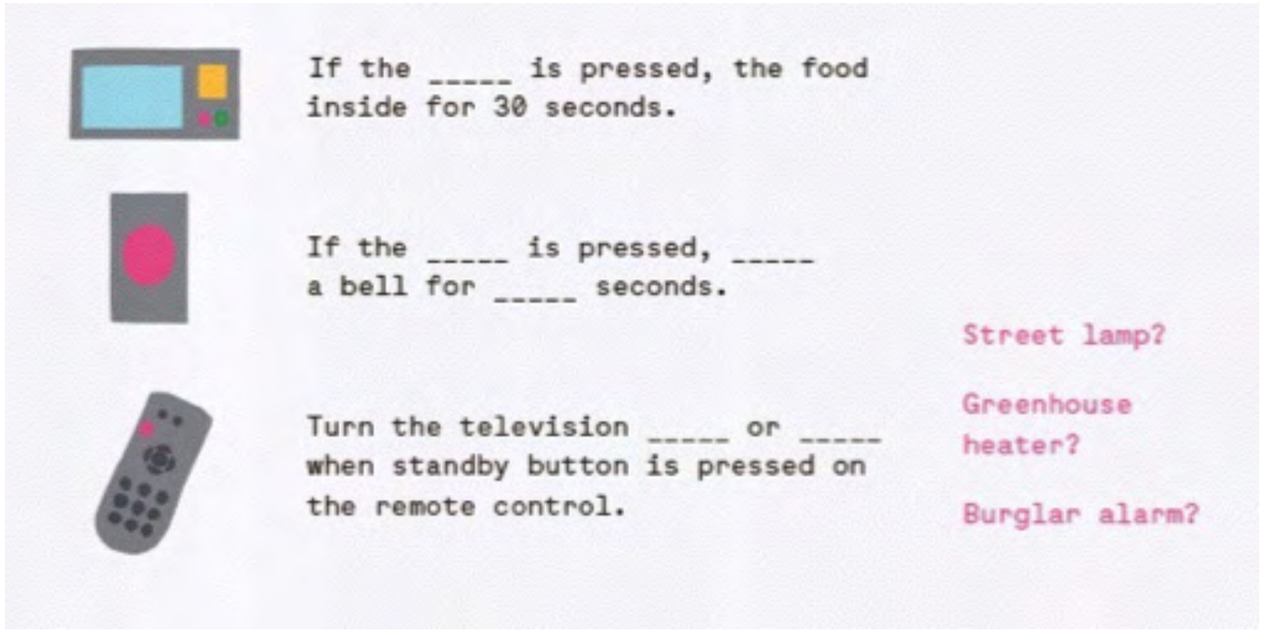
Represented computers as gears interlocking for a mechanical action to be carried out.



The Drafters

Super technical drawings included resistors, wires, motherboards, and everything electronic to show that there exists nothing but elements which a current runs through. **To our interpretation of their drawing, a computer is based on logic not magic, on connections not abstract things.**

There's hundreds of computers in every home.



My MagiCal ComPUTer

1 This is what I made into a computer:

2 The name of my computer:

Draw a picture of yourself using your new computer.

3 When I press the on/off button my computer will:

Computers have sensors that can recognize changes in the environment. Color the sensors your computer has and describe what they do.

- **Orientation.**
- **Temperature.**
- **Vibration.**
- **Moisture.**
- **Internet.**

YOU ARe GREAT!

www.helloruby.com

www.helloruby.com

www.hellоruby.com

I/O

Charles Babbage, Alan Turing, John von Neumann

CPU

Input

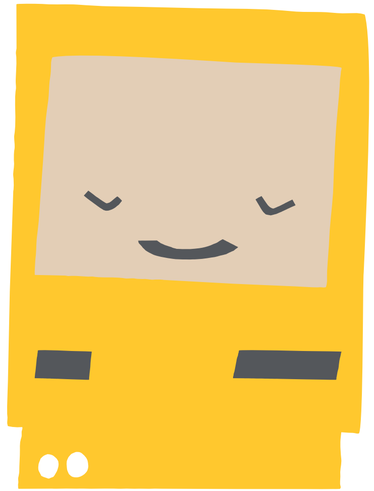
Control Unit

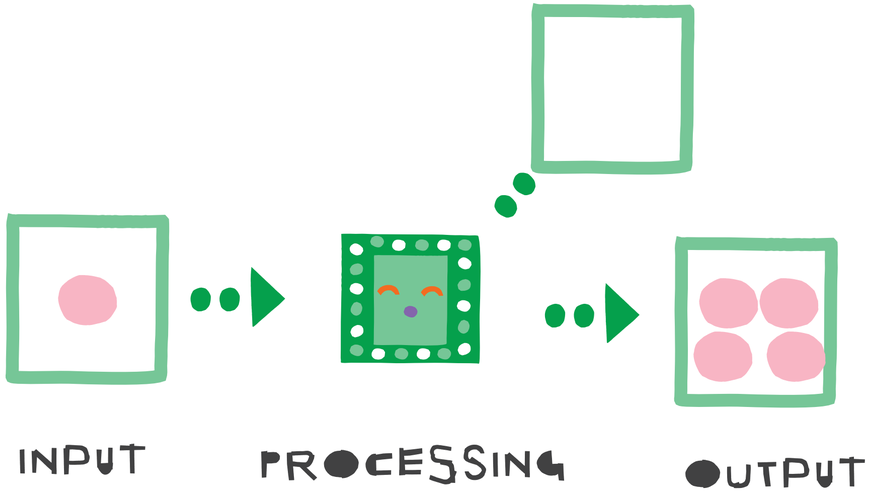
Arithmetic Logic Unit

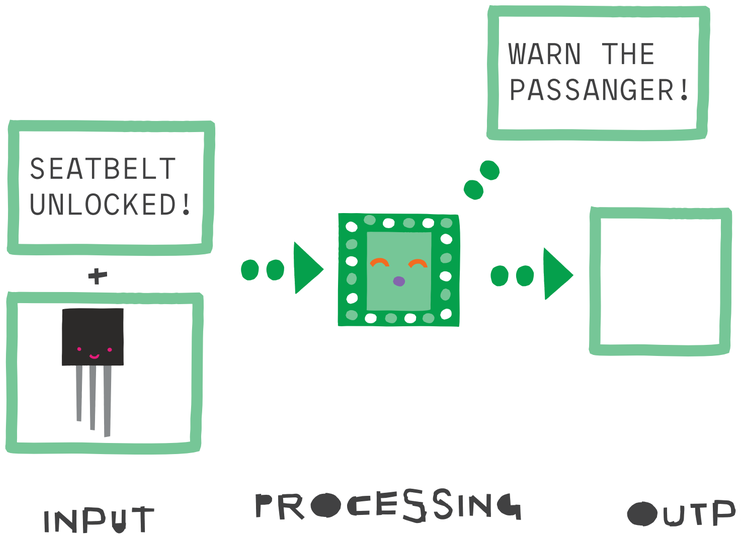
Immediate access store

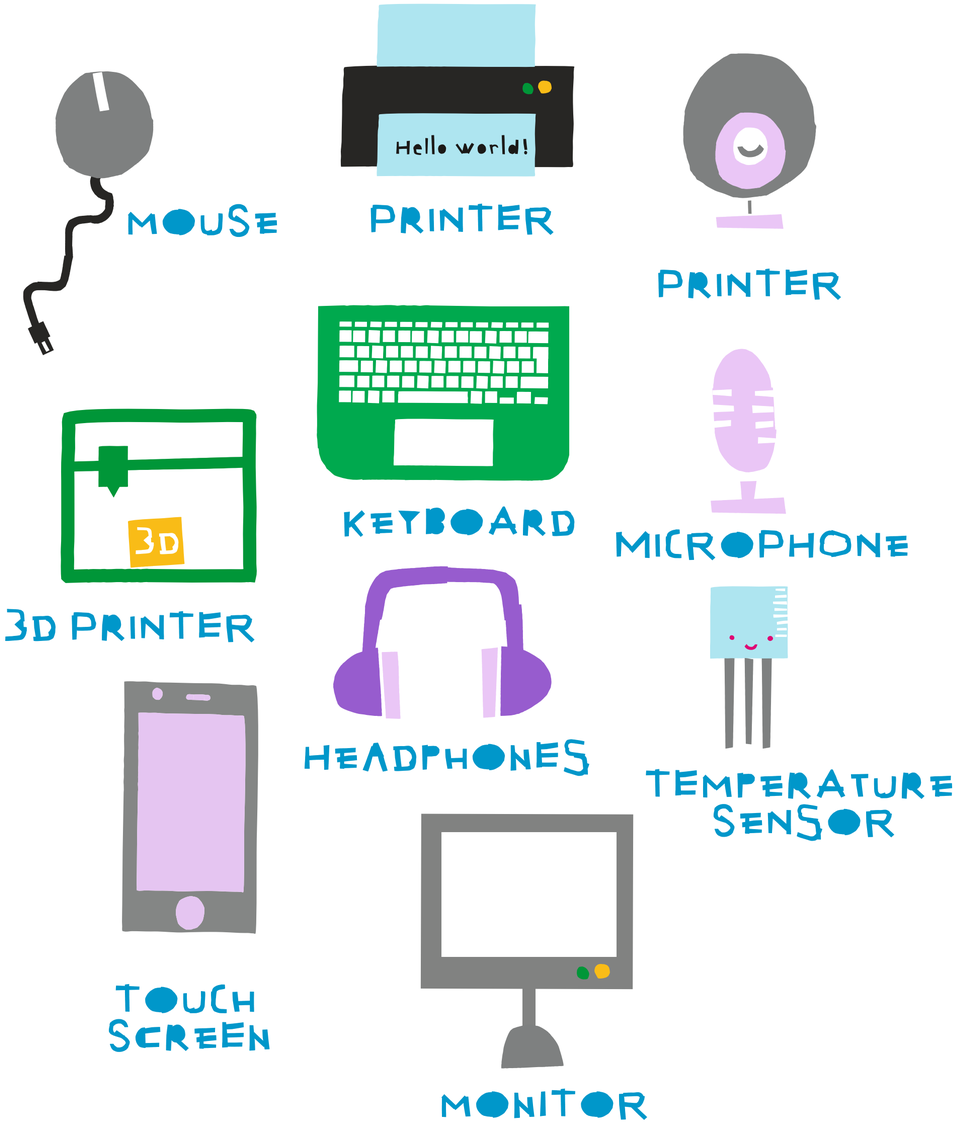
Program, Data and modified data

Output




INPUT
PROCESSING
OUTPUT

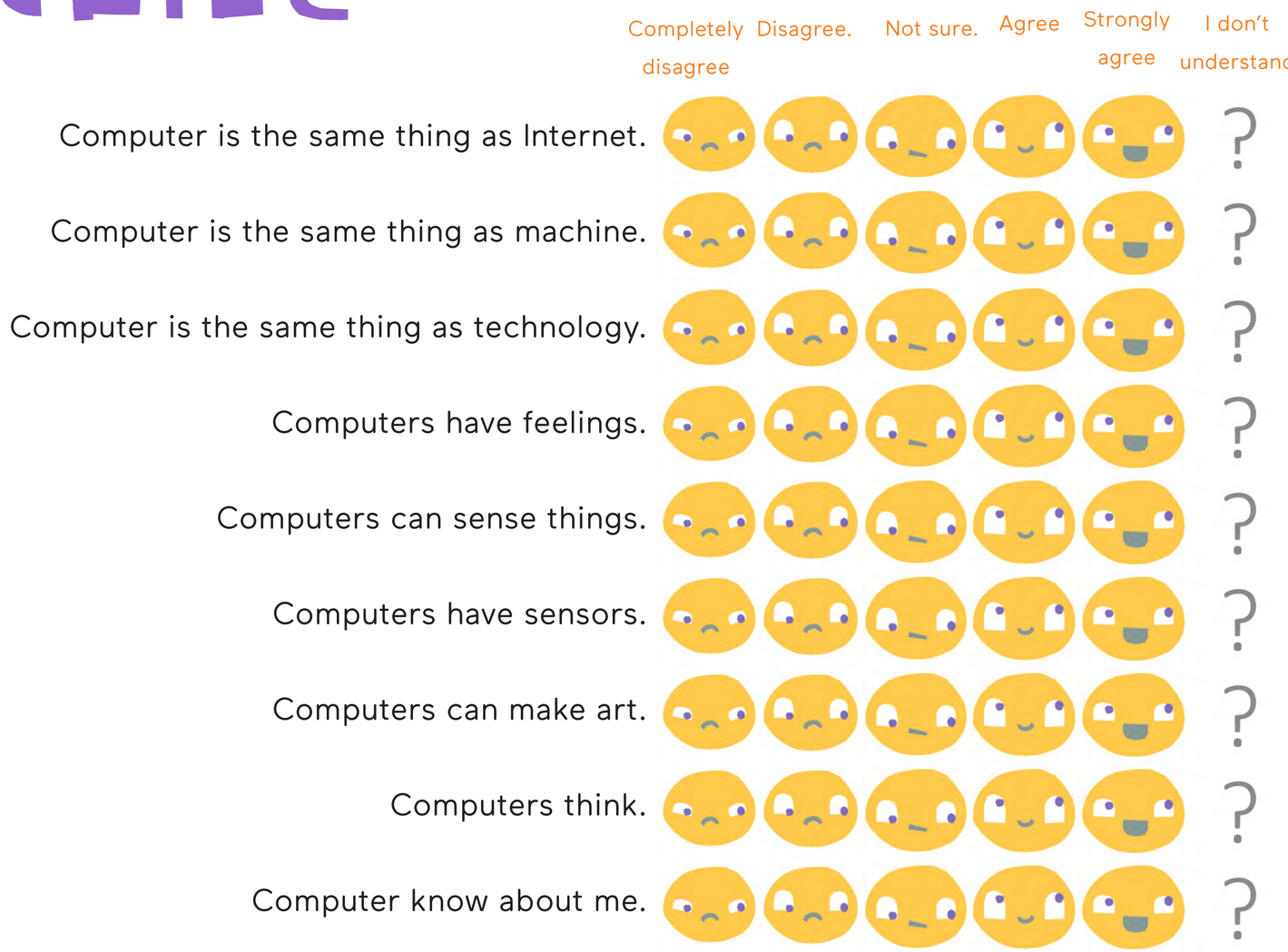

SEATBELT UNLOCKED!
+
WARN THE PASSANGER!
INPUT
PROCESSING
OUTPUT


MOUSE
Hello world!
PRINTER
PRINTER
3D
3D PRINTER
KEYBOARD
MICROPHONE
HEADPHONES
TEMPERATURE SENSOR
TOUCH SCREEN
MONITOR

Notional machine

“An abstraction of the computer that one can use for thinking about what a computer can and will do.”
- Benedict DuBoulay

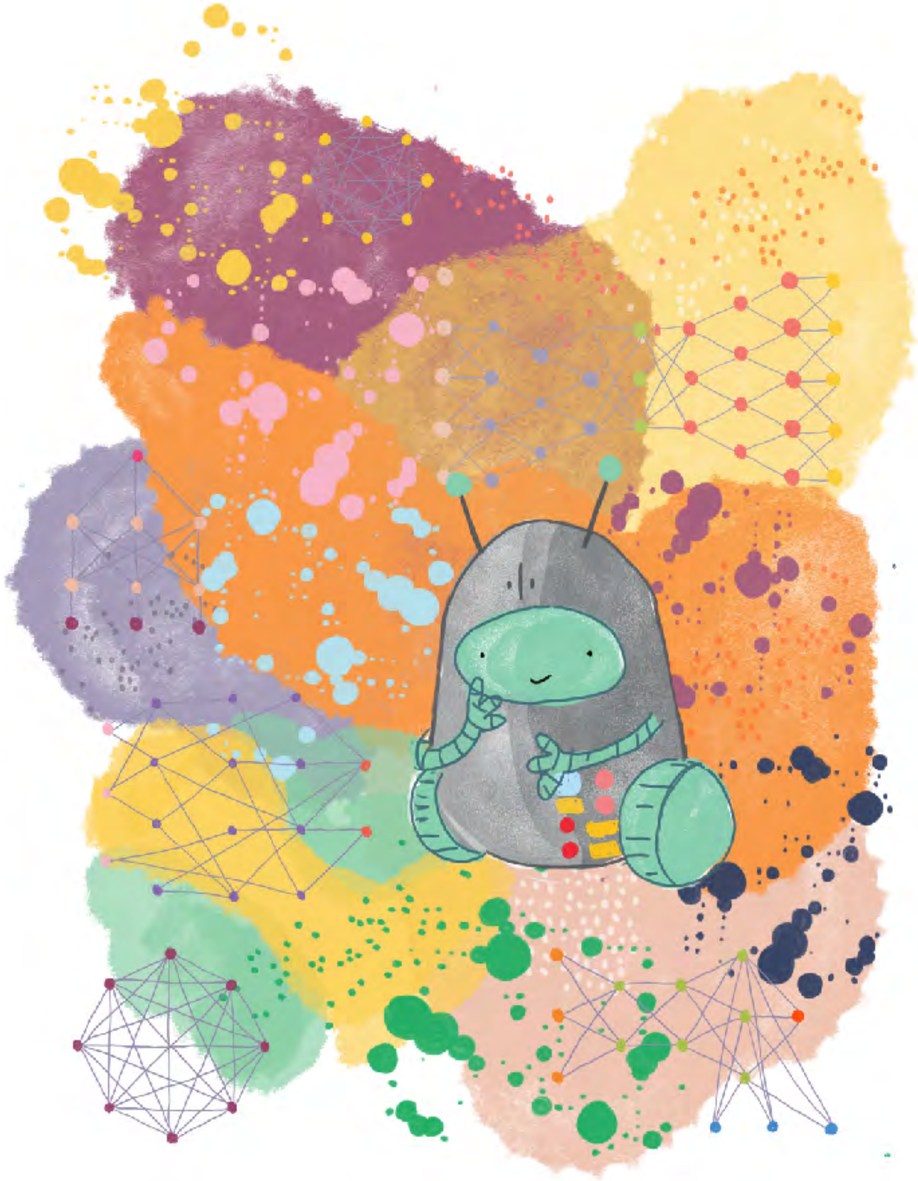
“We want students to understand what a computer can do, what a human can do, and why that’s different. To understand computing is to have a robust mental model of a notional machine.”
- Mark Guzdial



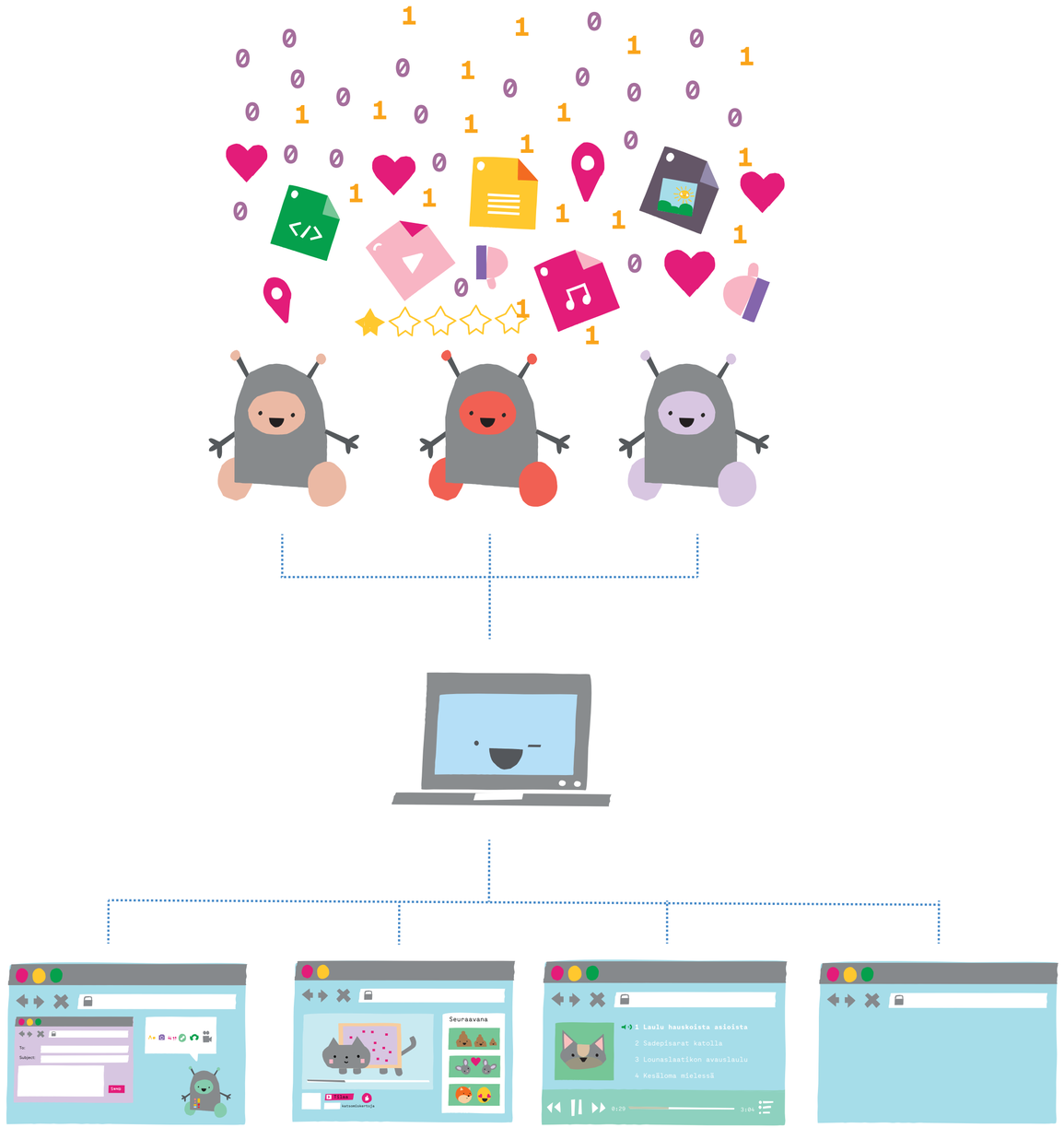
C

is for

creativity anc
computers



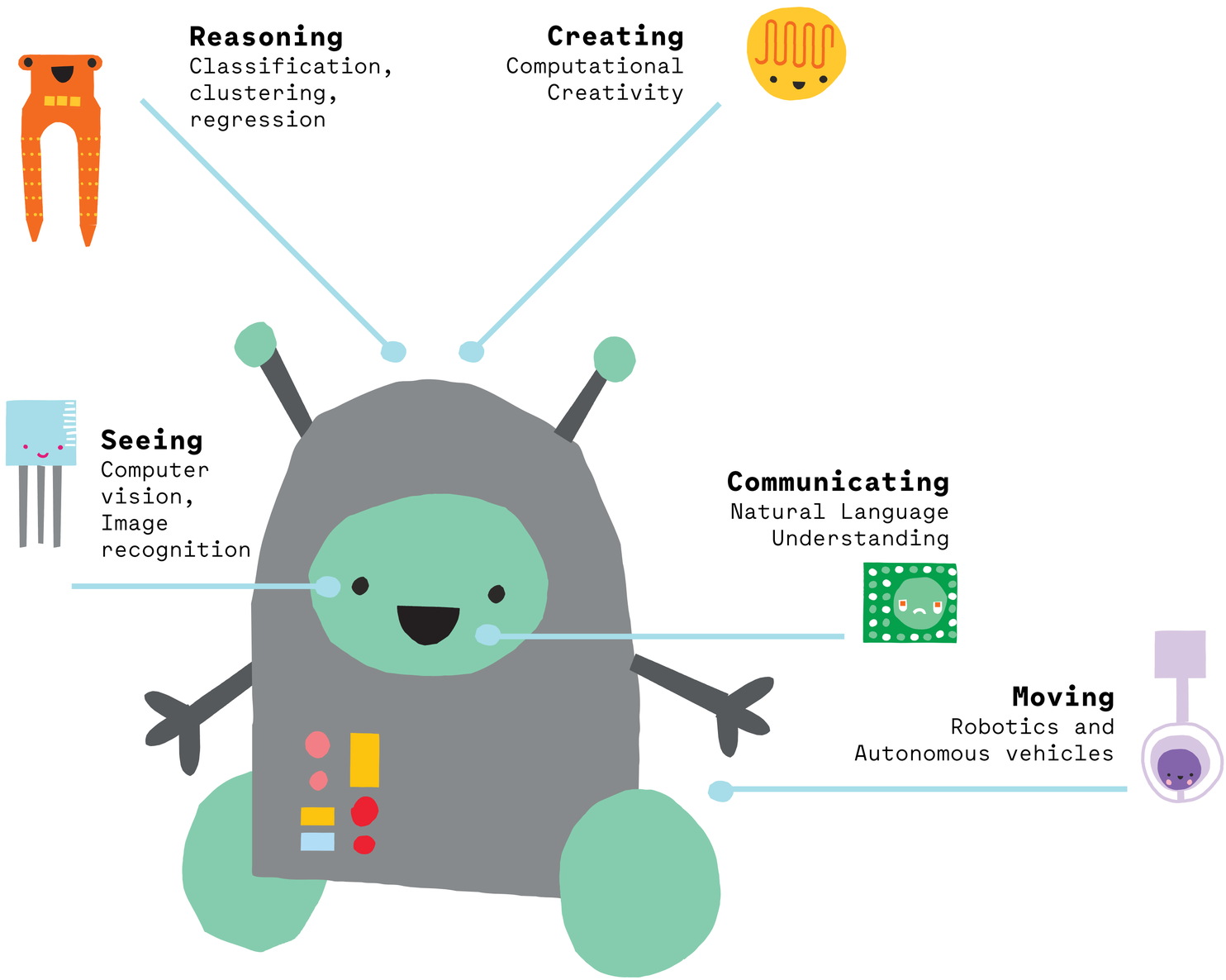
Here be the dragons


Seuraavana
1 Laulu hauskoista asioista
2 Sadepisarat katolla
3 Lounaslaatikon avauslaulu
4 Kesäloma mielessä

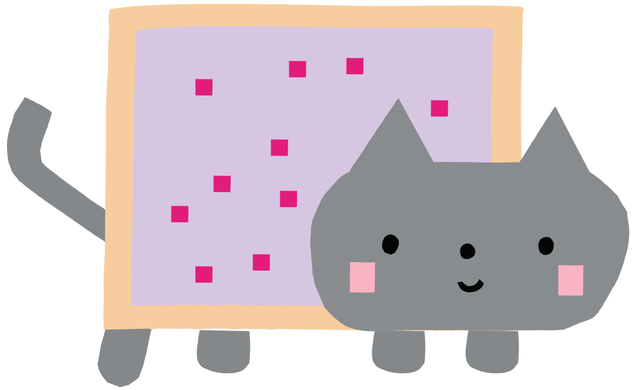
Data what?

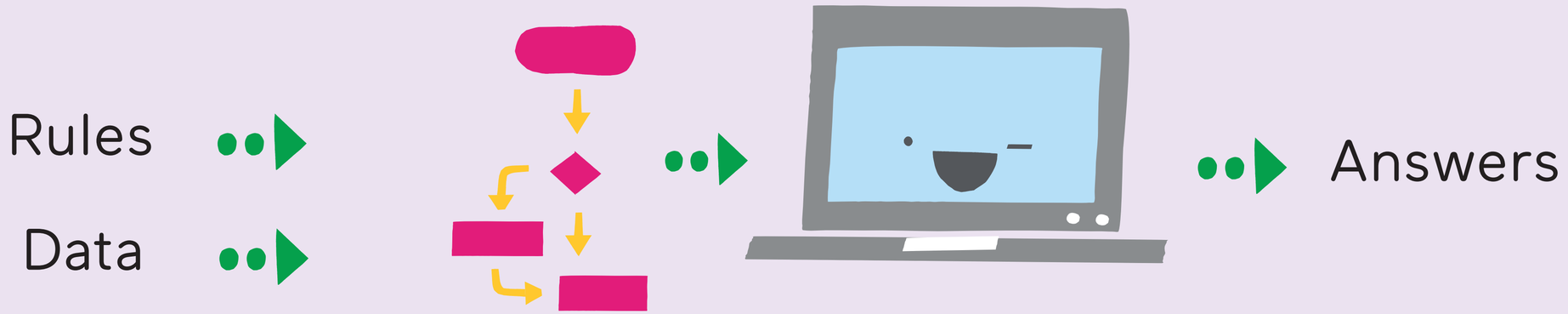
Behavioural, aggregated, big, incidental, demographic, derived, data.

Machine Learning

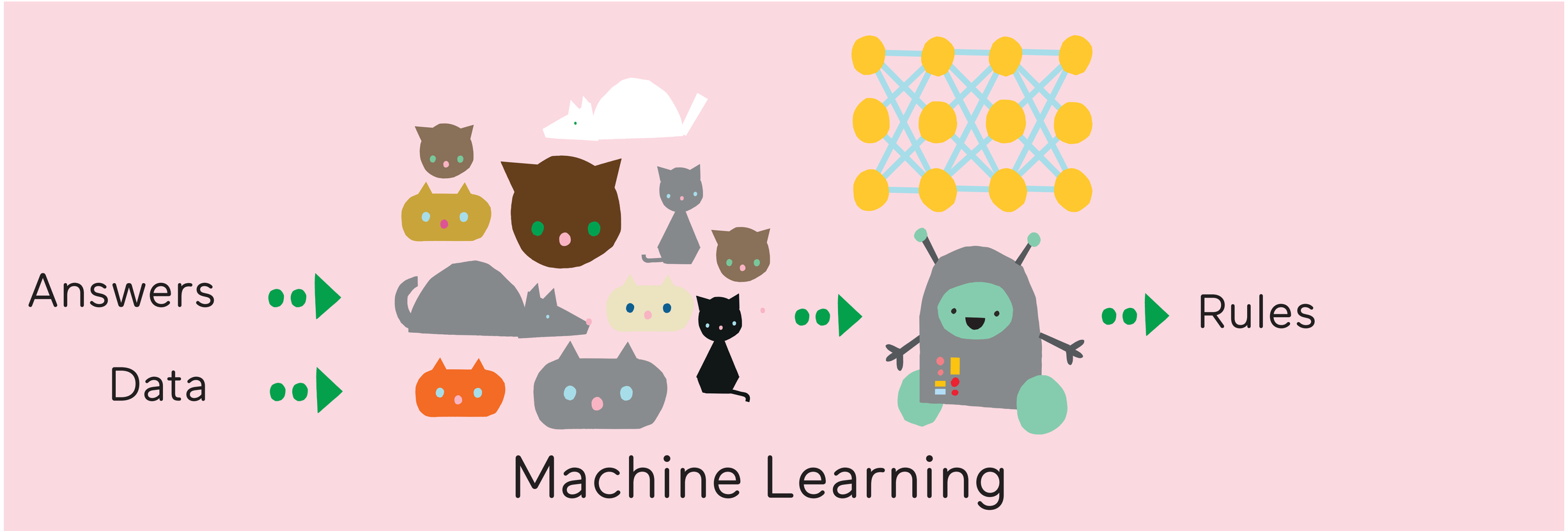


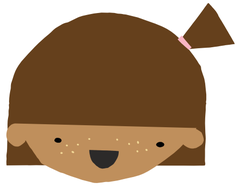
Is this a cat?





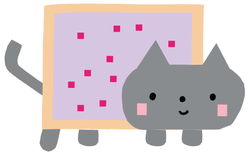
Traditional programming


Answers
Data
Rules
Machine Learning

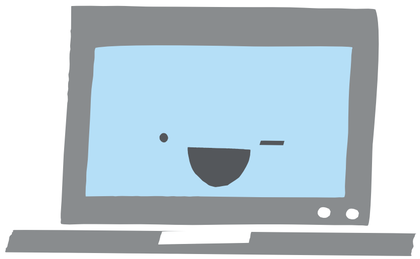


PROBLEM TO SOLVE

Is this a cat?



ANSWER THE QUESTION



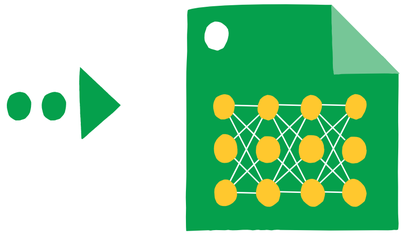
GATHER DATA

Examples of cats

GATHER DATA

Examples of cats

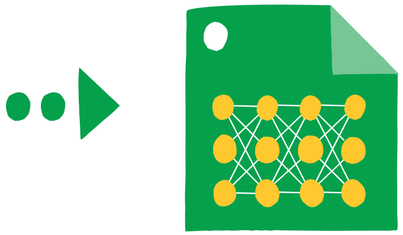
BUILD A MODEL



GATHER DATA

Examples of cats

BUILD A MODEL



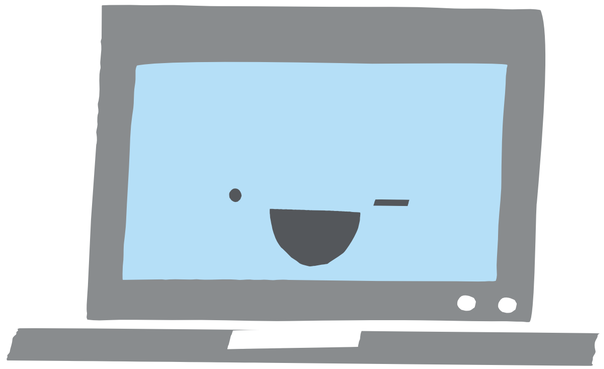
ANSWER THE QUESTION

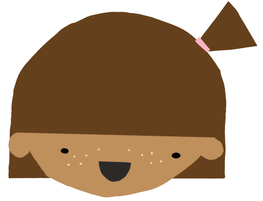
Yes!

in

out

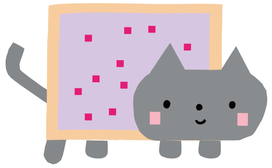
```
snowleopard  CERTAIN, 0.6
cat          LIKELY, 0.39
monkey       UNLIKELY, 0.01
```





PROBLEM TO SOLVE

Is this a cat?



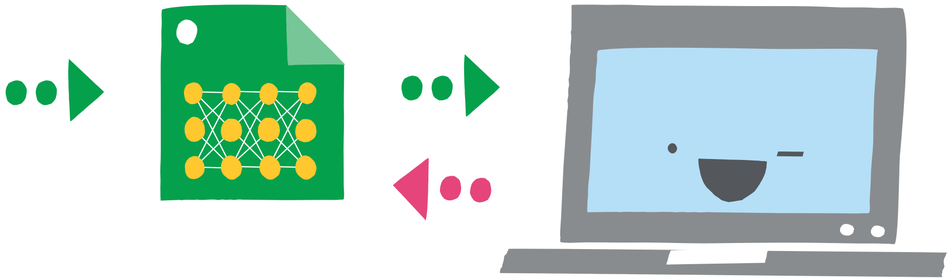
ANSWER THE QUESTION

Yes!

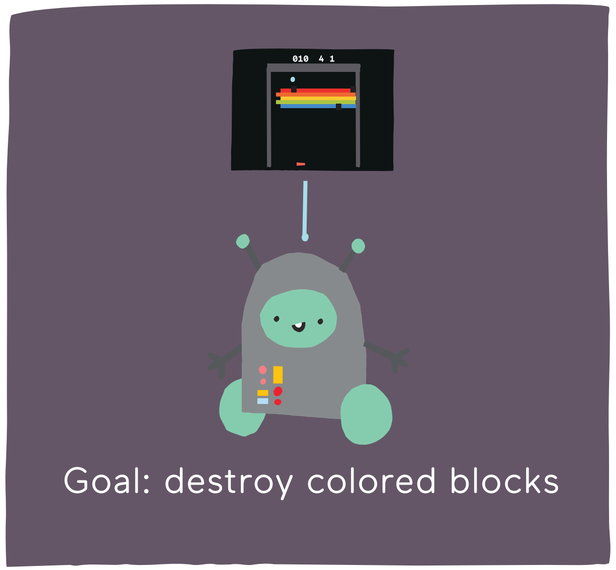
GATHER DATA

Examples of cats

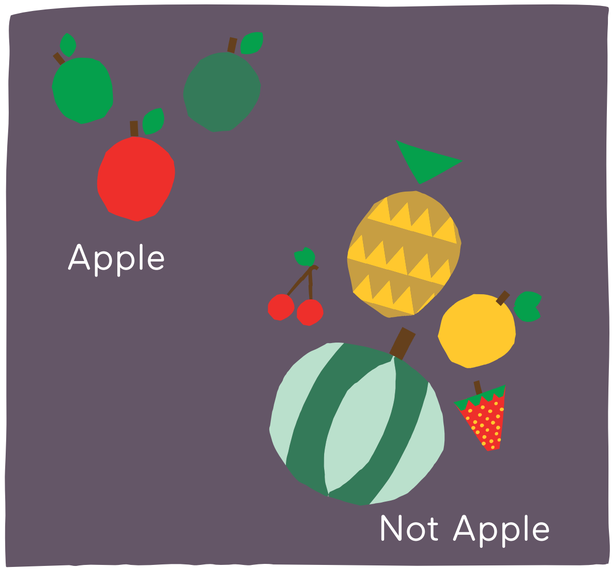
BUILD A MODEL



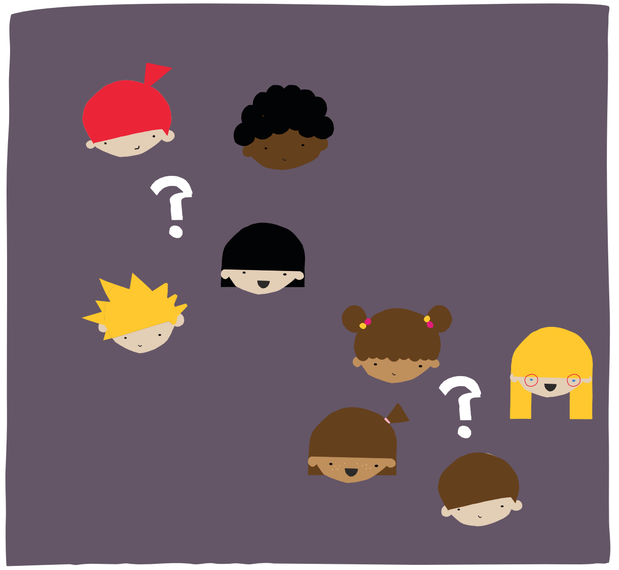
UPDATE MODEL



Reinforcement learning

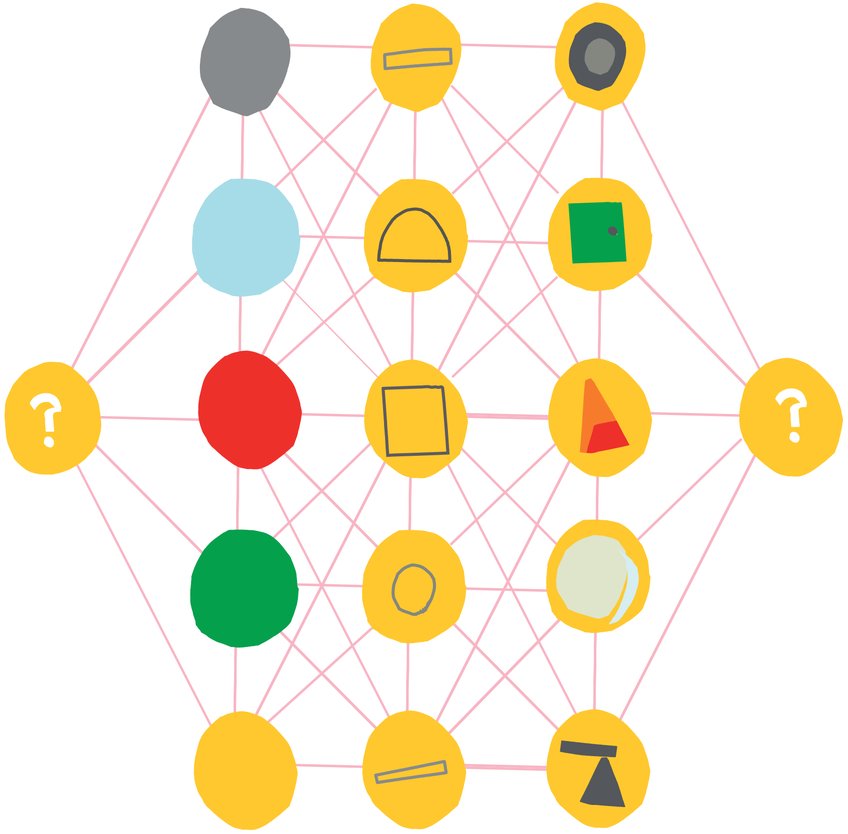


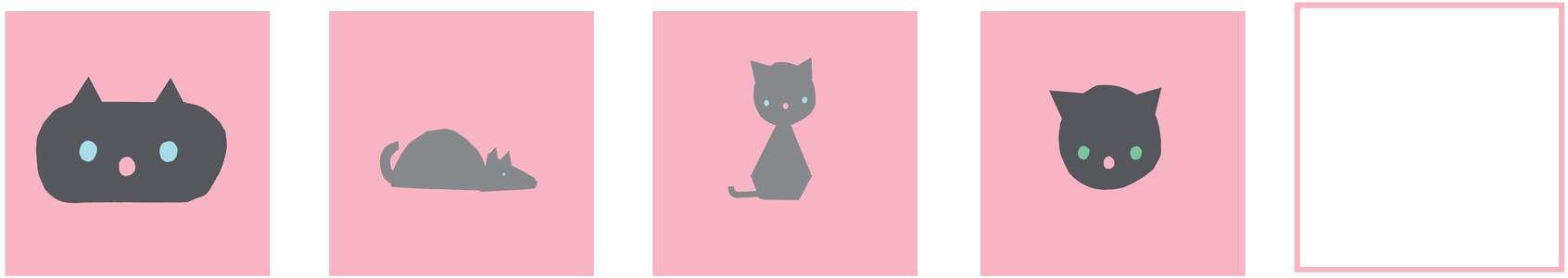
Supervised Learning Algorithms

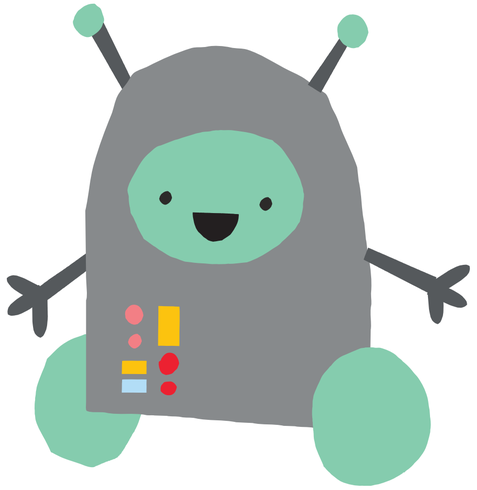


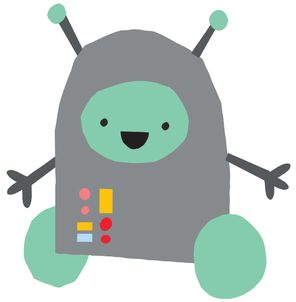
Unsupervised Learning Algorithms

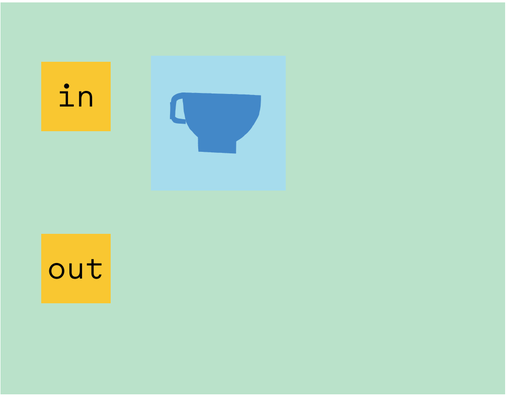
Colors Edges Parts

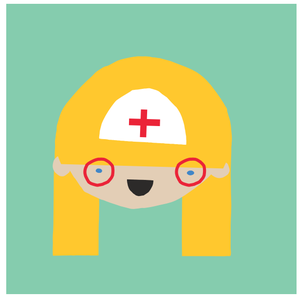
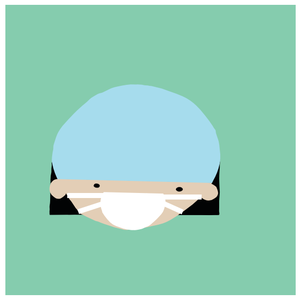


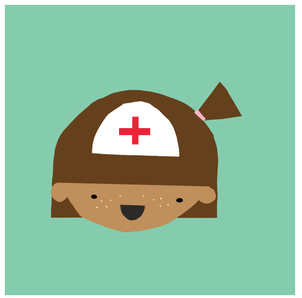
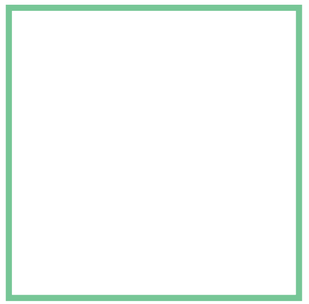
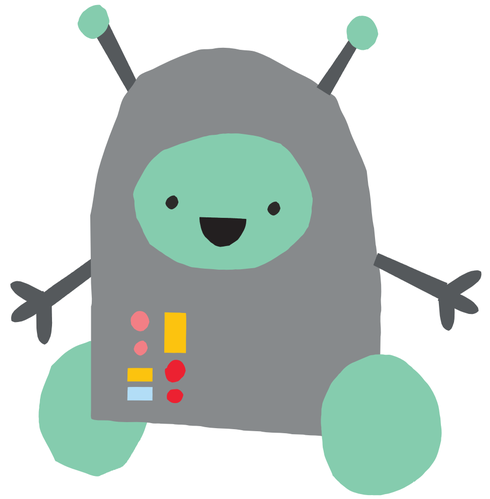




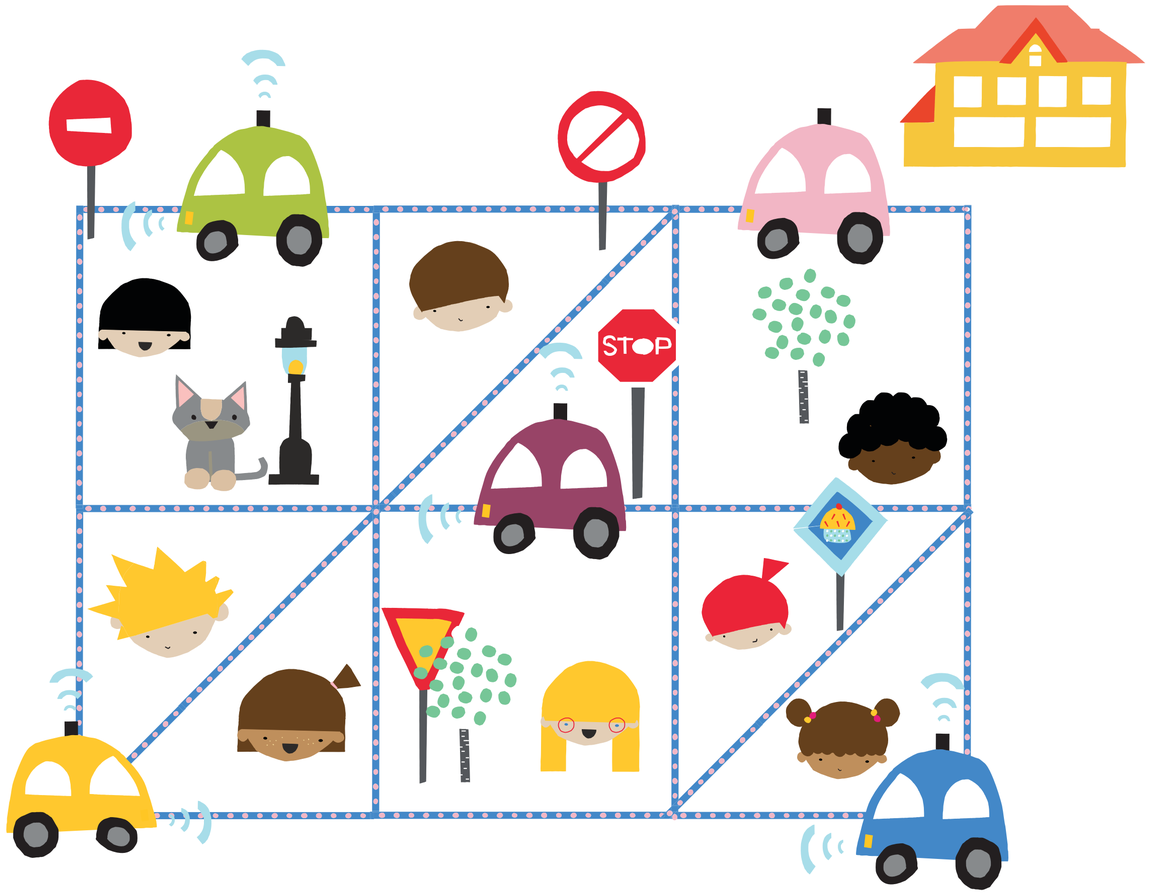



in
out

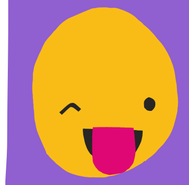
INPUT	OUTPUT	APPLICATION
Picture	Are there human faces (0 or 1)	Photo tagging
English sentence	French sentence	Translation
Car cameras	Position of other cars	Self-driving cars
Audioclip	Transcript of audio clip	Speech recognition



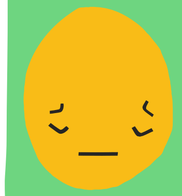
INPUT	PROCESS	OUTPUT
Car cameras	Map of position of other cars	Driving

I'M GOOD AT:

MY COMPUTER IS GOOD AT:



I'M NOT SO GOOD AT:

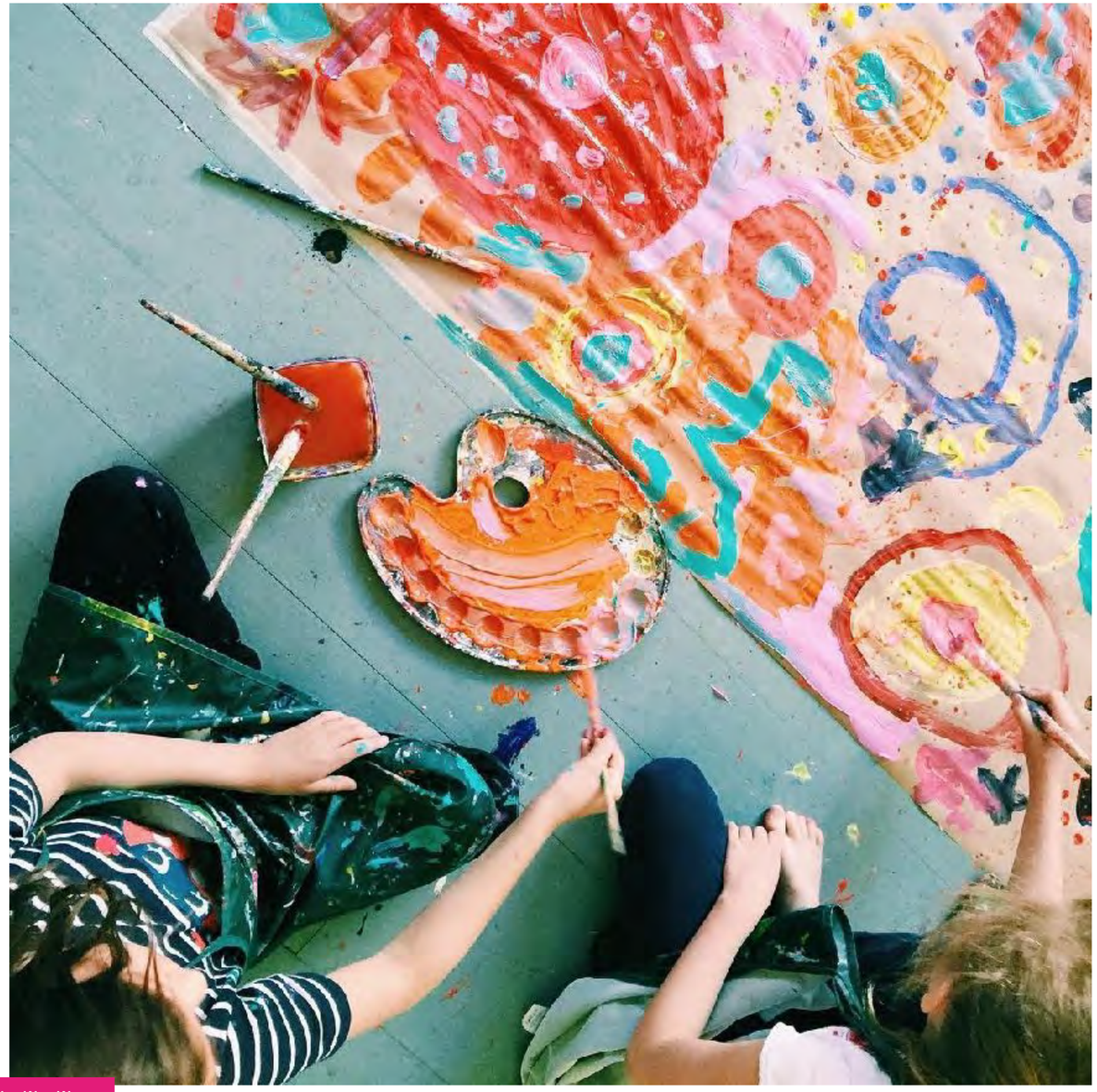


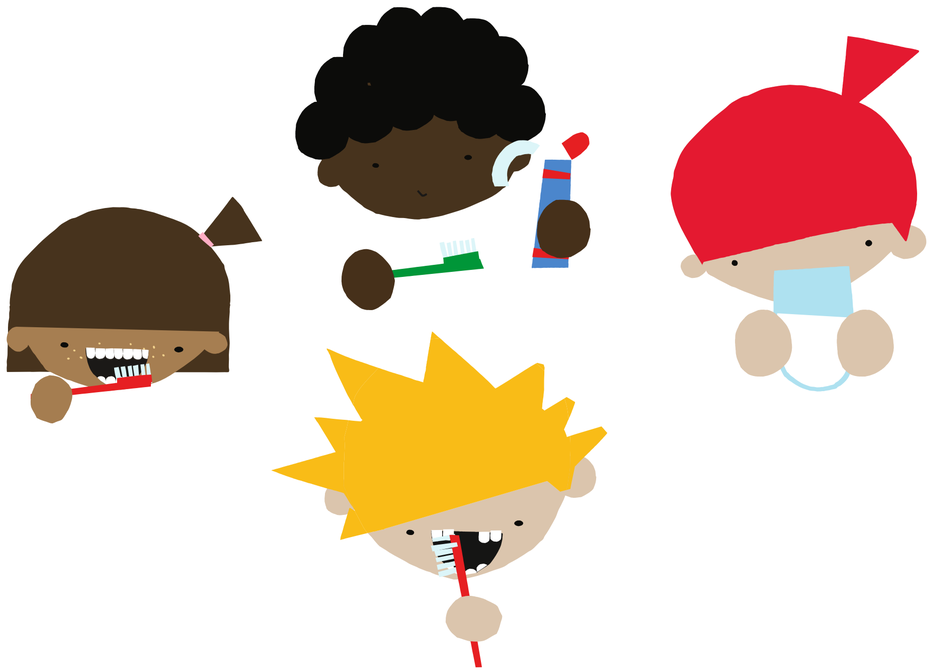
MY COMPUTER IS NOT SO GOOD AT:

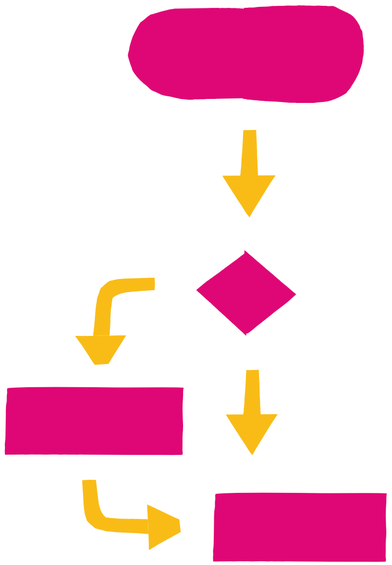
AFTER DOING THIS EXERCISE I FEEL:

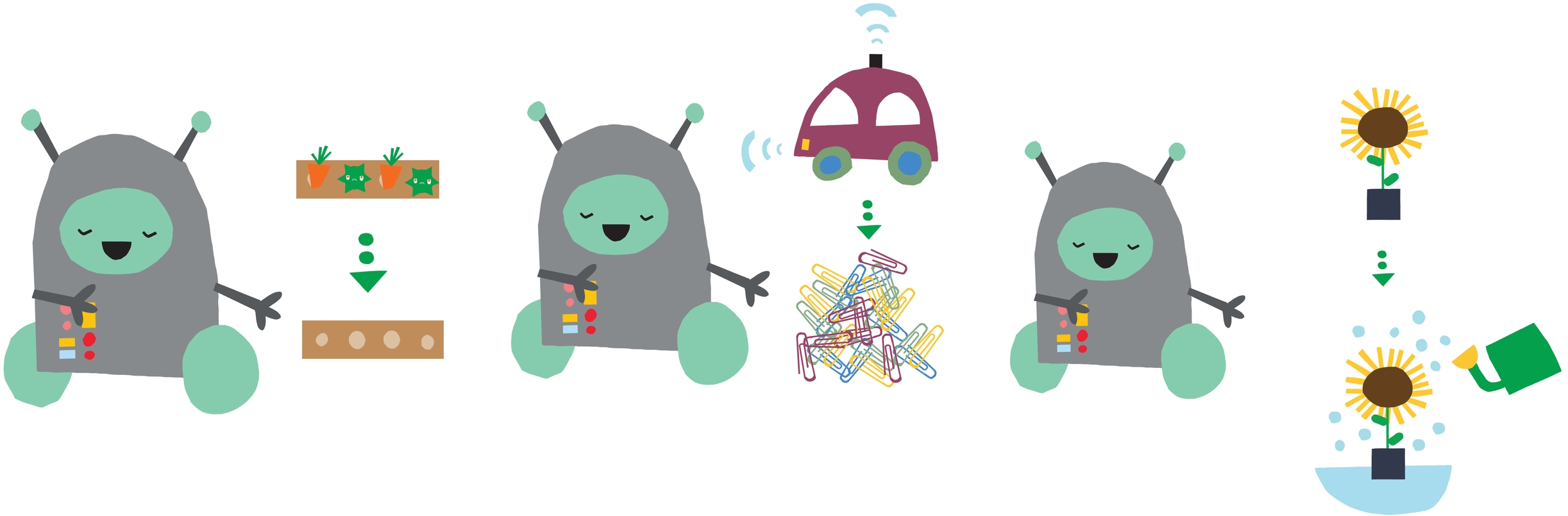
AFTER DOING THIS EXERCISE MY COMPUTER FEELS:

www.helloruby.com



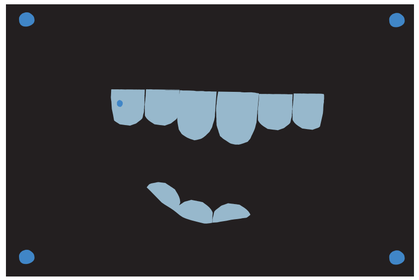






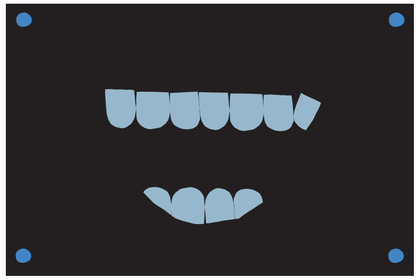
LINUS

JULIA

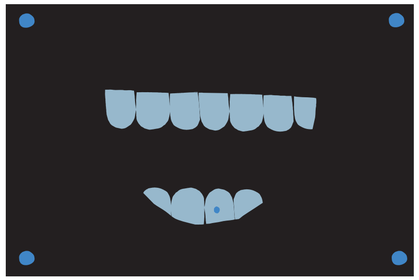


DJANGO

RUBY



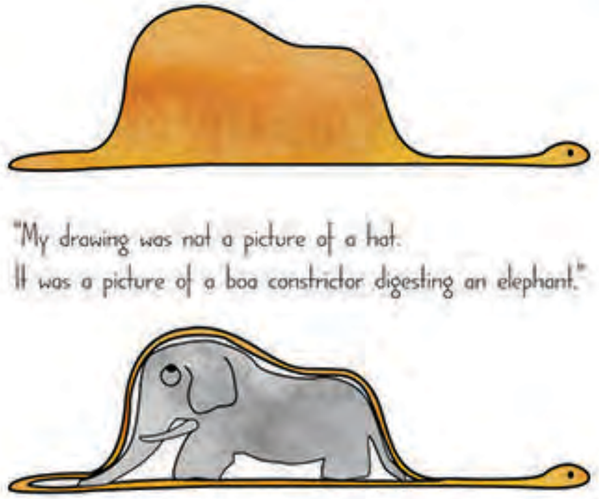
ADA



TEUVO

The next big thing?

www.helloruby.com



"Whenever I met one of them who seemed to me at all clear-sighted, I tried the experiment of showing him my Drawing Number One, which I have always kept. I would try to find out, so, if this was a person of true understanding. But, whoever it was, he, or she, would always say: 'That is a hat.' Then I would never talk to that person about boa constrictors, or val forests, or stars. I would bring myself down to his level. I would talk to him about bridge, and golf, and politics, and neckties. And the grown-up would be greatly pleased to have met such a sensible man.
- Antoine de Saint-Exupéry"

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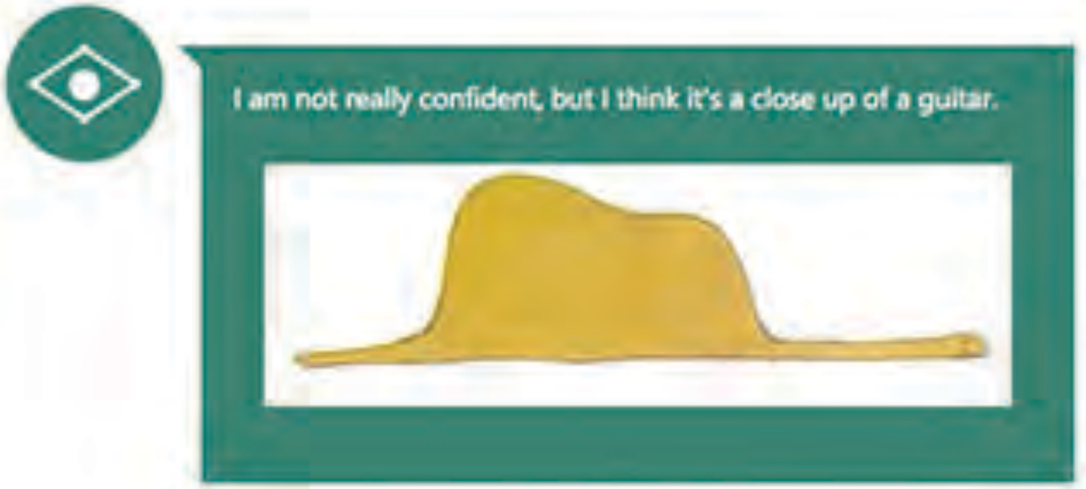
I am not really confident, but I think it's a close up of a guitar.

Make memories.

Projects that are interesting, timely, relevant, moving, whimsical, thoughtful, original, imaginative..

Playful

Allow for repetition

Simple

Self-teaching

Beautiful

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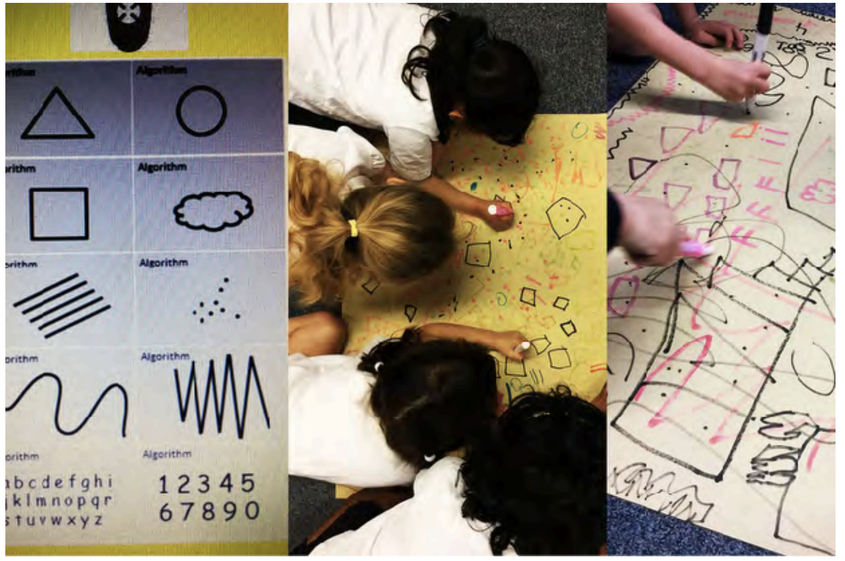

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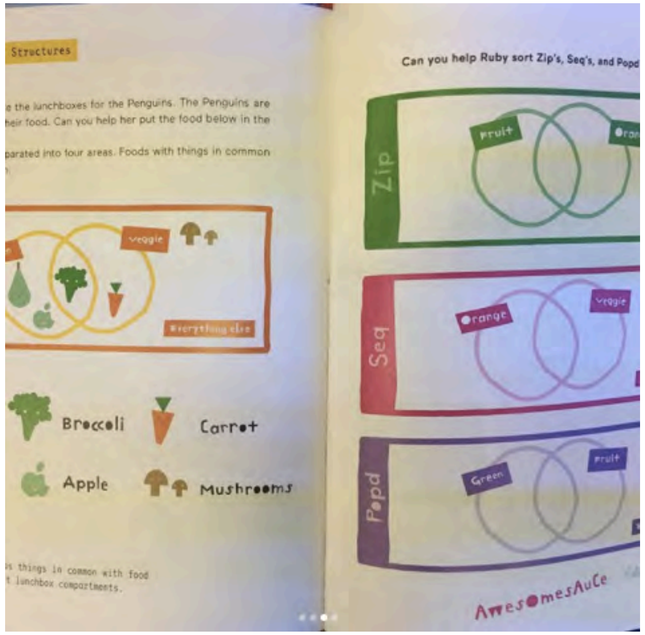

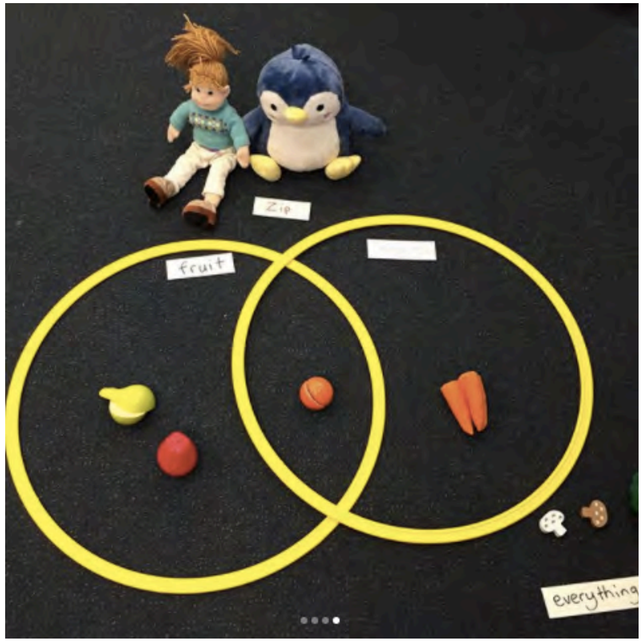

This primary school teacher from Perth teaches boolean logic in a pretty adorable way. For more of Jo's work, see https://www.instagram.com/trunktaleswithmrsr/

www.helloruby.com

Year 3 in Condell Park Public School in Australia got to know different data types and especially the BOOLEAN EXPRESSIONS! They designed their own creatures and came up with tricky true/false statements.

HELLO
RUBY

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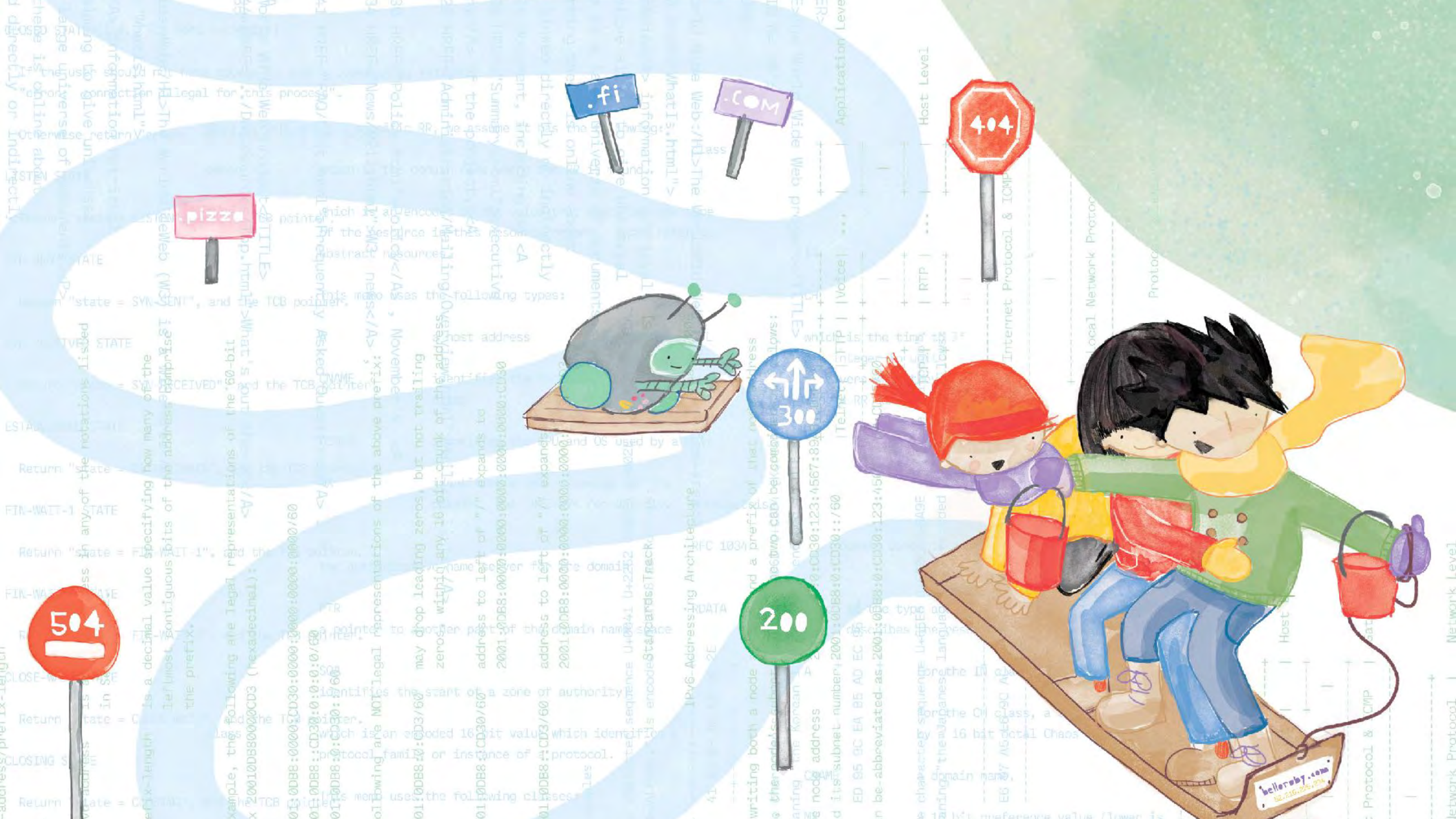
1

What happens in a world where we don’t have the vocabulary to express what is around us?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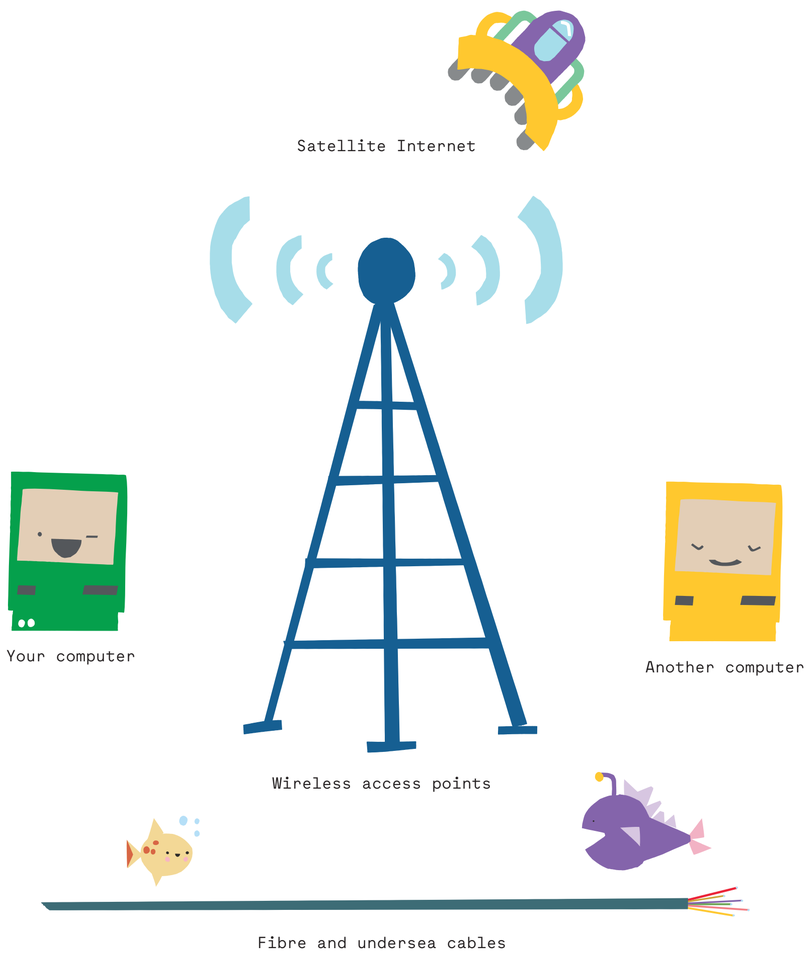
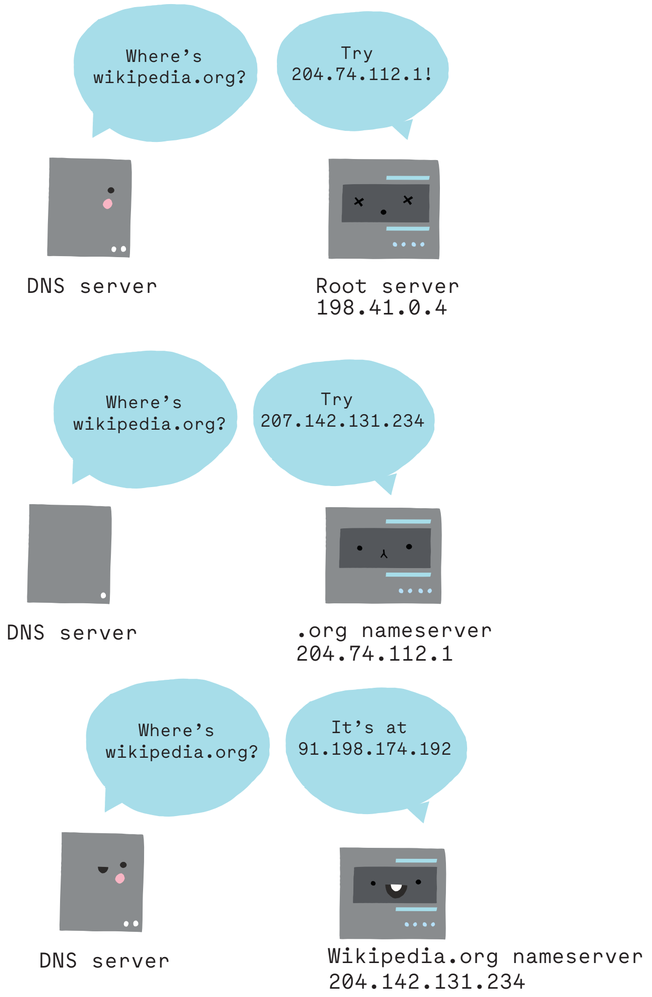
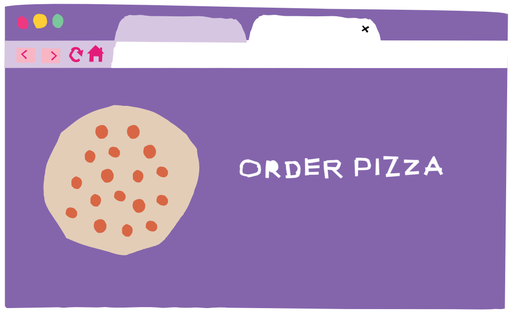


Hardware



Software



Impact

Reggio Emilia

The 100 languages

The child is made of one hundred.
The child has
a hundred languages
a hundred hands
a hundred thoughts
a hundred ways of thinking
of playing, of speaking.

A hundred.

Always a hundred
ways of listening
of marveling, of loving
a hundred joys
for singing and understanding
a hundred worlds
to discover
a hundred worlds
to invent
a hundred worlds
to dream.

The child has
a hundred languages
(and a hundred hundred hundred more)
but they steal ninety-nine.
The school and the culture
separate the head from the body.
They tell the child:
to think without hands
to do without head
to listen and not to speak
to understand without joy
to love and to marvel
only at Easter and at Christmas.

They tell the child:
to discover the world already there
and of the hundred
they steal ninety-nine.

They tell the child:
that work and play
reality and fantasy
science and imagination
sky and earth
reason and dream
are things
that do not belong together.

And thus they tell the child
that the hundred is not there.
The child says:
No way. The hundred is there.

-Loris Malaguzzi
(translated by Lella Gandini)
Founder of the
Reggio Emilia Approach

Technology is built on humanity.

Computer *(km-pytr)*
n.
person who makes calculations or computations; a calculator, a reckoner; spec. a person employed to make calculations in an observatory, in surveying.

Technology (from Greek τέχνη)
Techne, "art, skill, cunning of hand"; and -λογία, -logia[1]. Techniques, skills and competencies alongside the tools needed to do the job. Agriculture is a technology; democracy is a technology.

Exercise 3

Explain!

What is technology? What is it used for?
And who uses it?

Technology is electricity that moves. It is used to play. I use it to have a conversation with my mom, we use a WhatsApp application. People uses technology.

else
if
else
else
else
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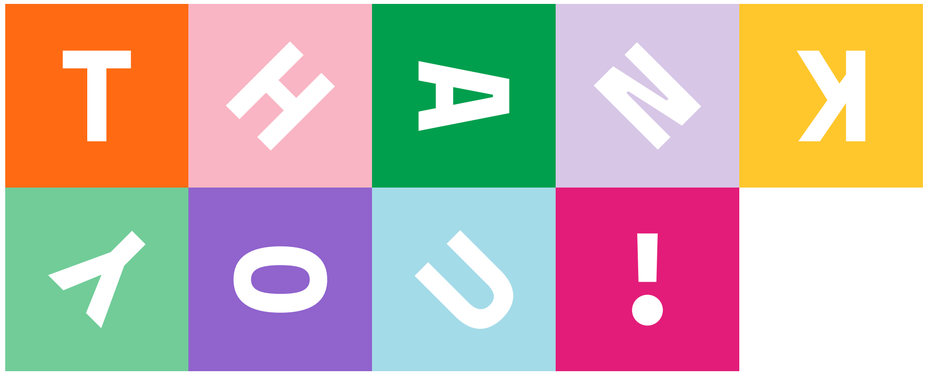

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