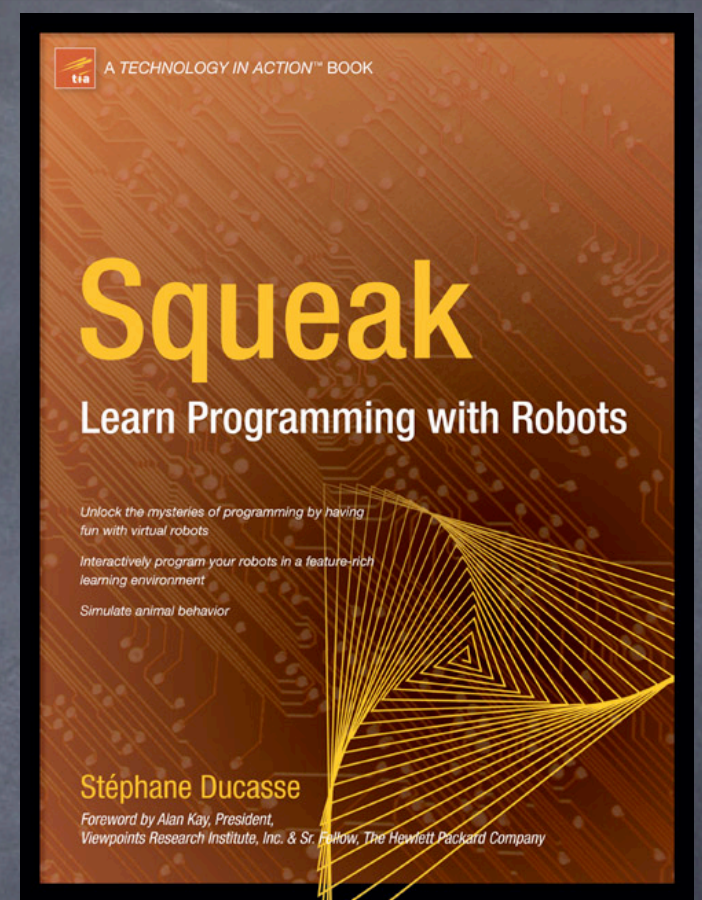


Bots Inc.... fun learning programming

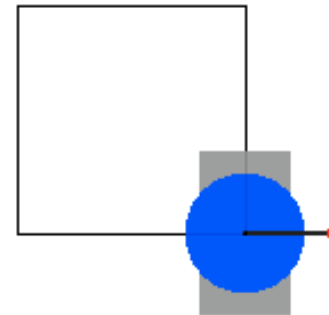
<http://smallwiki.unibe.ch/botsinc/>
ducasse@iam.unibe.ch



Teaching Programming to Kids of 7..99

- What is a program?
- What is a variable, loop and argument?
- How can I reuse and compose some programs
- Programming is fun!

A kind of Turtle...

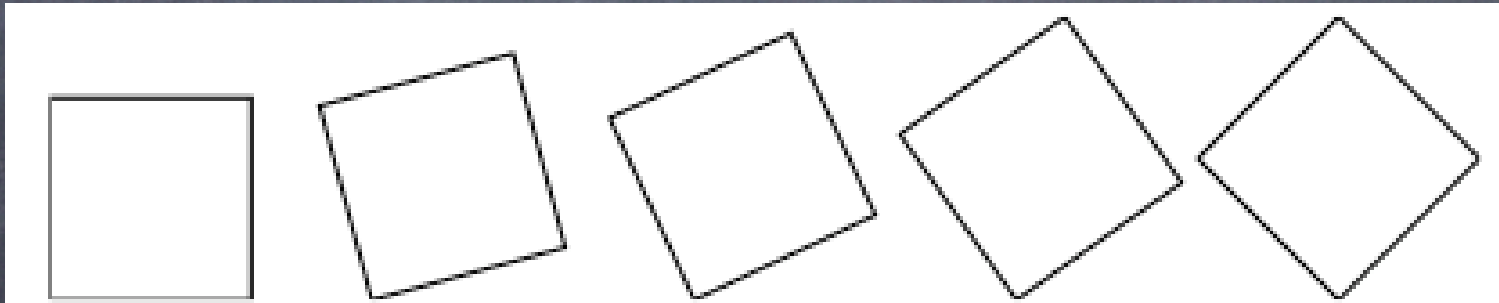


Working

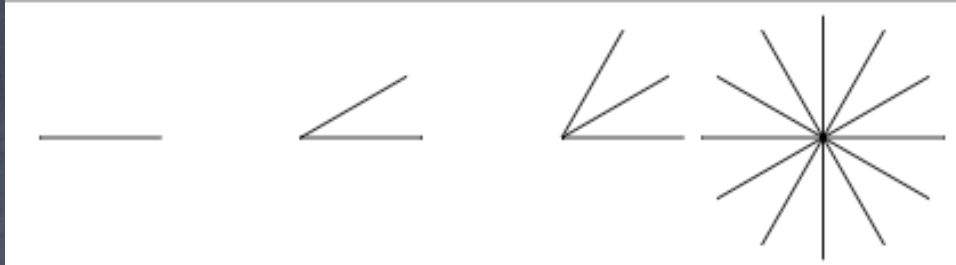
```
Bot Workspace
Do It All Do It Clear Trails Clear Bots Clear All
| pica |
pica => Bot new.
pica square: 100
```

```
Micro Browser: Bot
private morphic wrapper
shapes
turning
variables
square: size
```


Directions, Absolute, Relative Angles



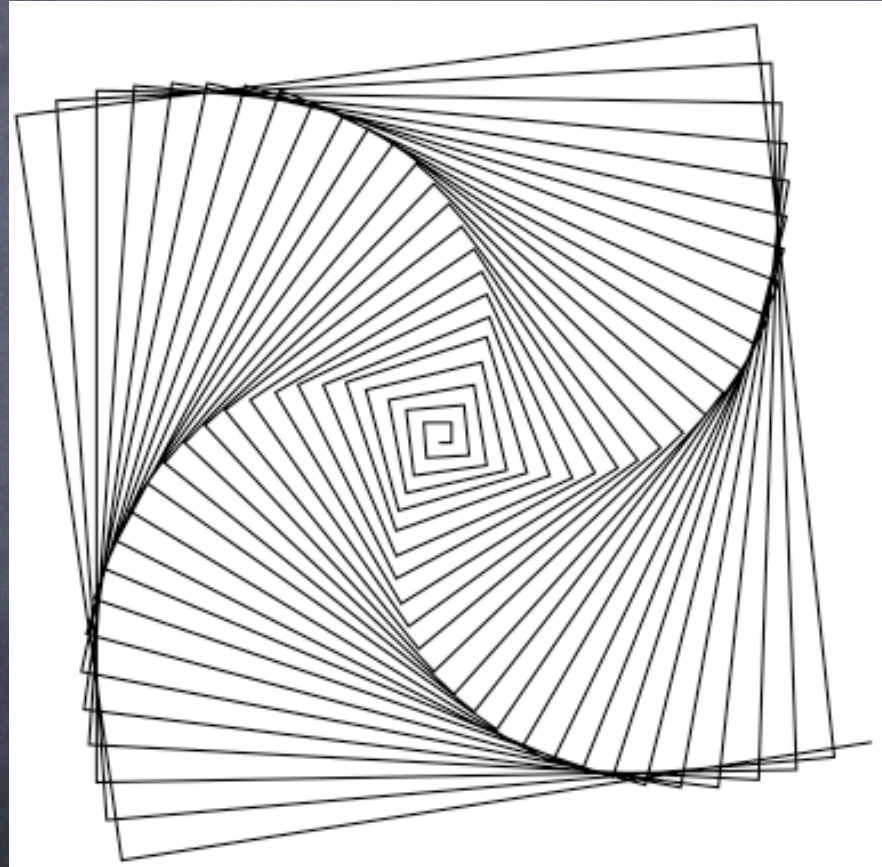
Why Loops?



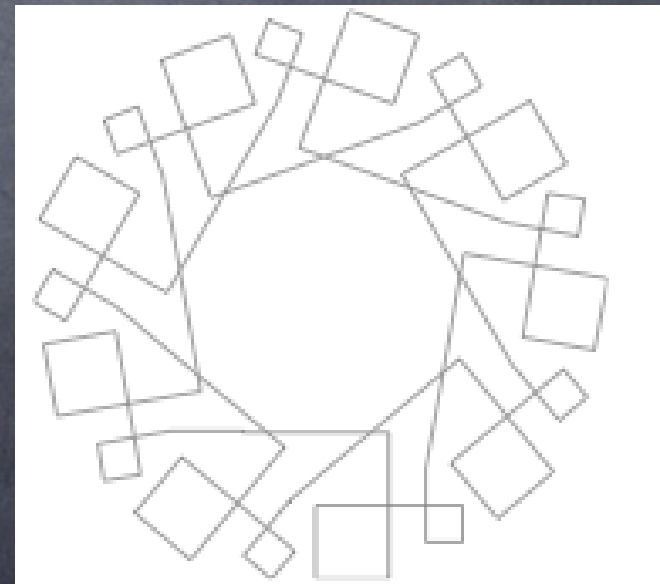
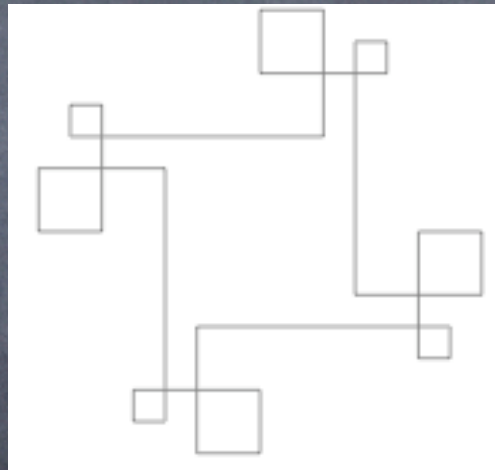
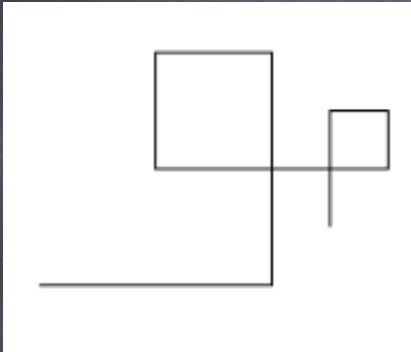
```
I pica I
pica := Bot new.
pica go: 70.
pica turnLeft: 180.
pica go: 70.
pica turnLeft: 180.
pica turnLeft: 60.
pica go: 70.
pica turnLeft: 180.
pica go: 70.
pica turnLeft: 180.
pica turnLeft: 60.
pica go: 70.
pica turnLeft: 180.
pica go: 70.
pica turnLeft: 180.
pica turnLeft: 60.
pica go: 70.
pica turnLeft: 180.
pica go: 70.
pica turnLeft: 180.
pica turnLeft: 60.
pica go: 70.
pica turnLeft: 180.
pica go: 70.
pica turnLeft: 180.
pica turnLeft: 60.
```

```
I pica I
pica := Bot new.
6 timesRepeat:
  [pica go: 70.
  pica turnLeft: 180.
  pica go: 70.
  pica turnLeft: 180.
  pica turnLeft: 60]
```

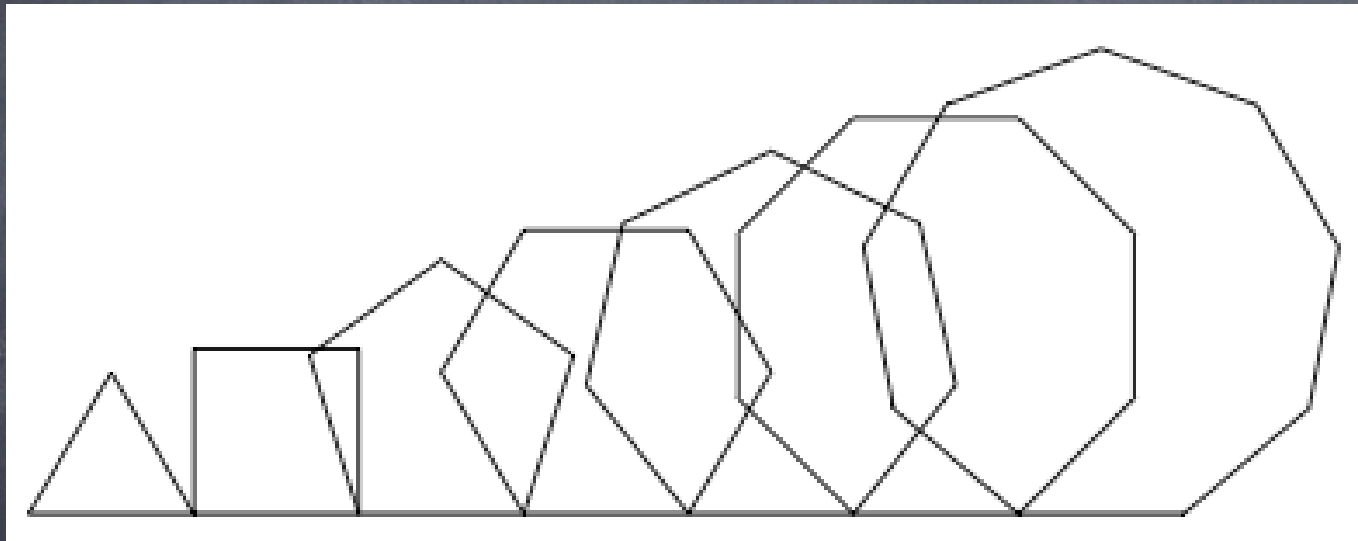

Loops and Variables



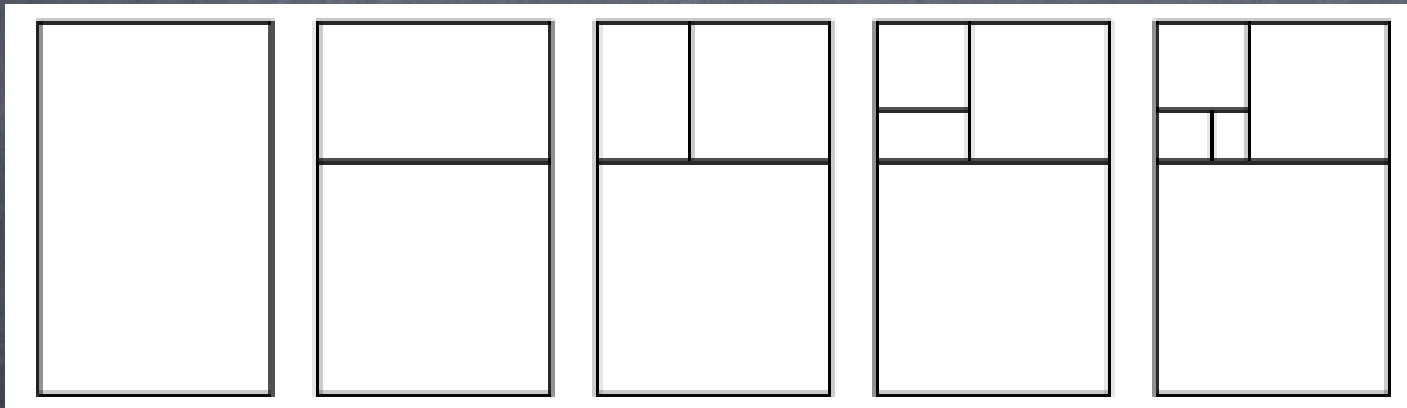
Abstraction and Composition



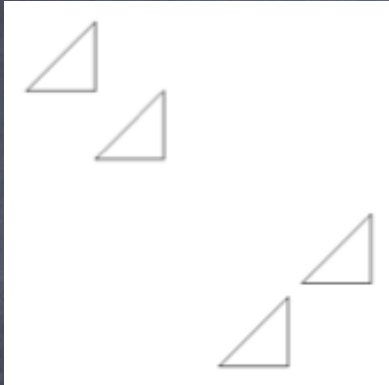
Arguments



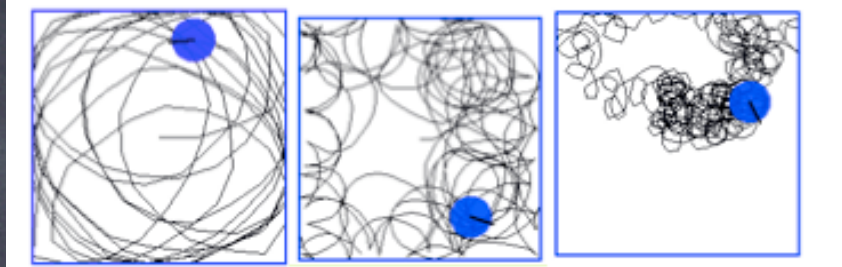
Some Problems



Translation



Bug Life



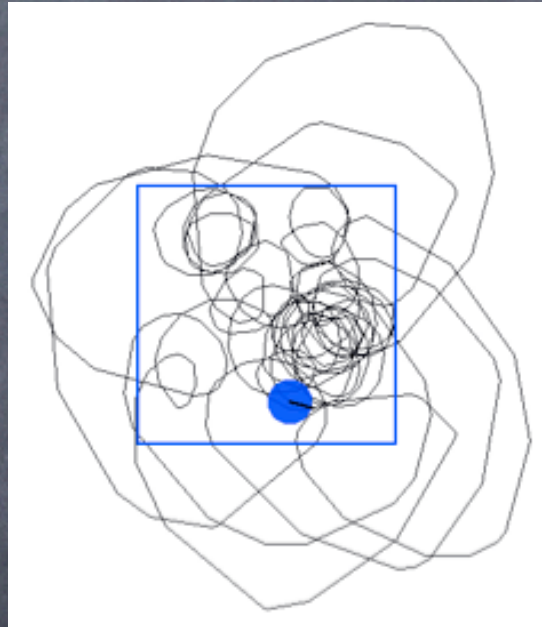
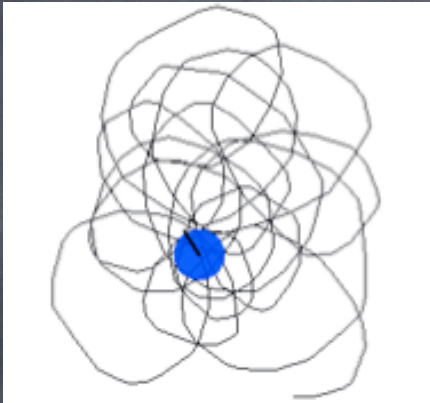
wandering: n

"Make the robot walking by a random length and turn randomly its direction"

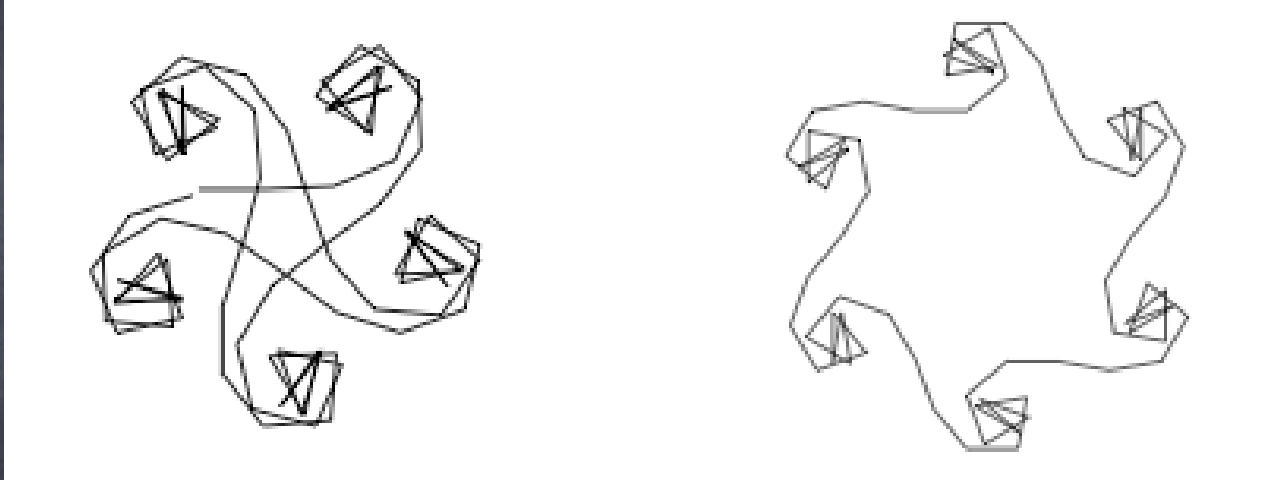
n timesRepeat:

```
[self go: 30 atRandom.  
self turnLeft: 30 atRandom]
```

Within a Box



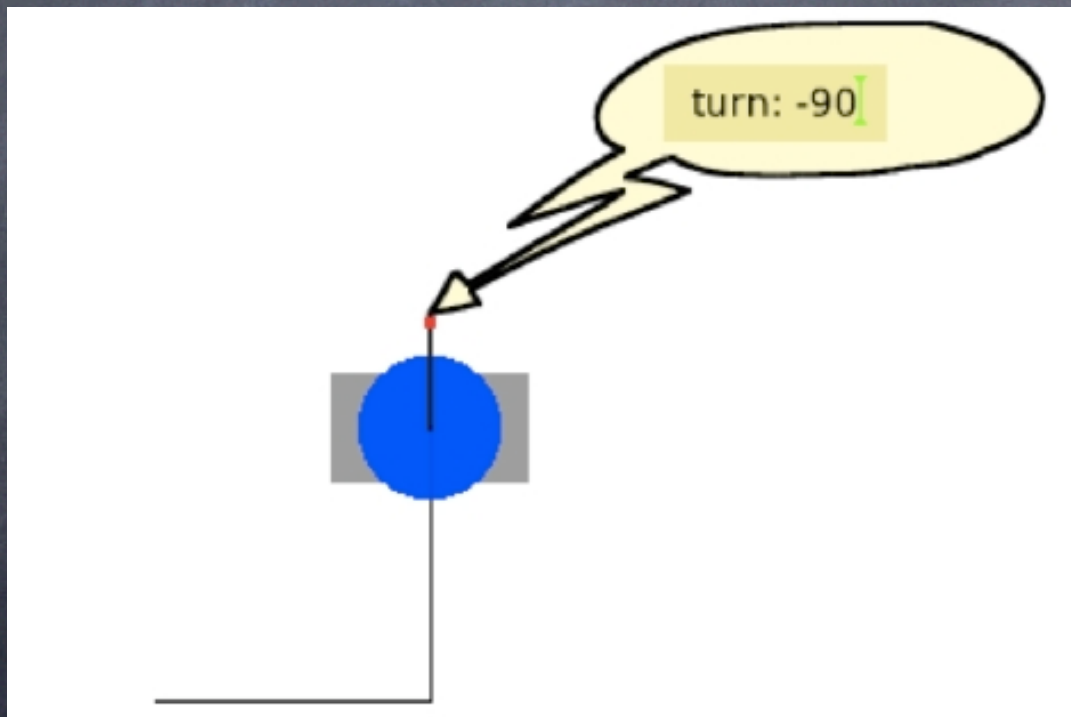
Fun...



Three Levels

- Direct manipulation
- Scripts
- Methods

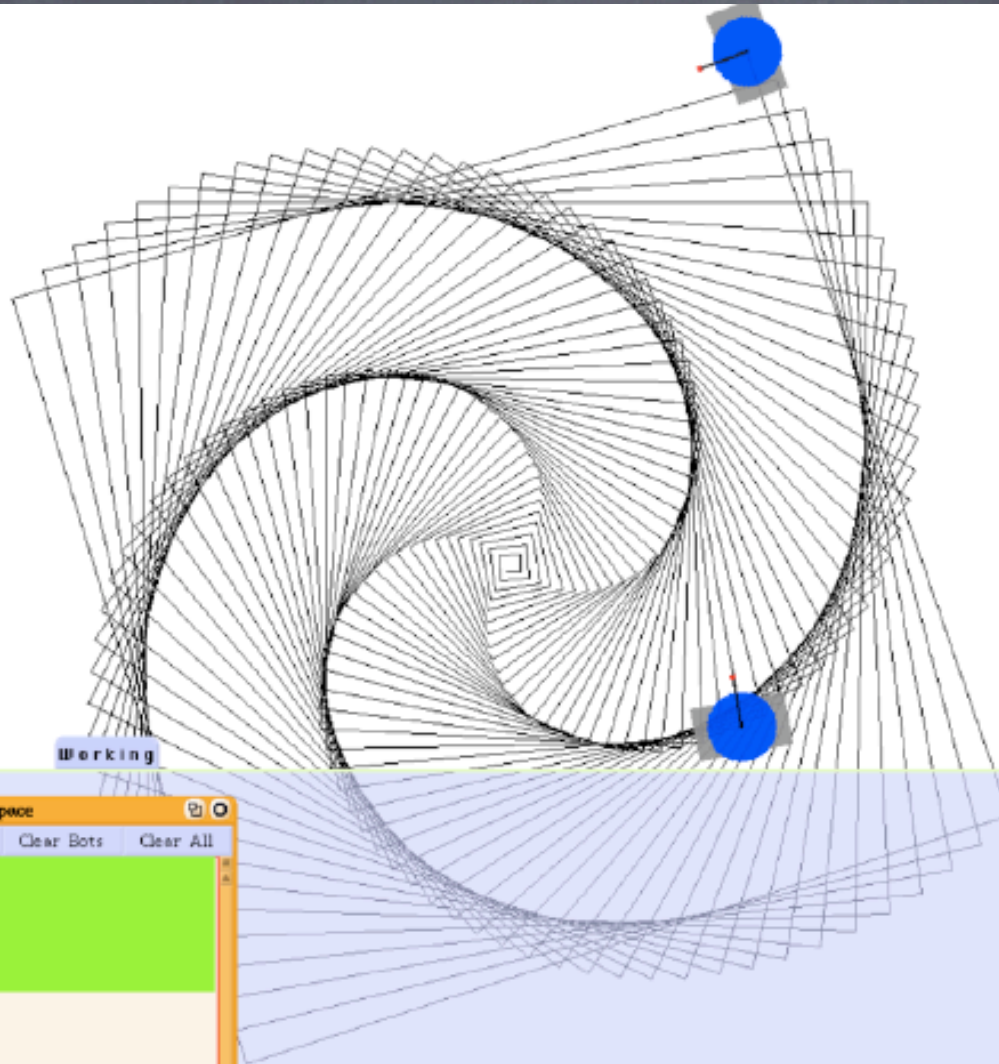
Direct Interaction



A Script

```
| r2d2 |  
r2d2 := Bot new.  
4 timesRepeat:  
    [ r2d2 go: 100.  
      r2d2 turn: 90 ]
```


Bot



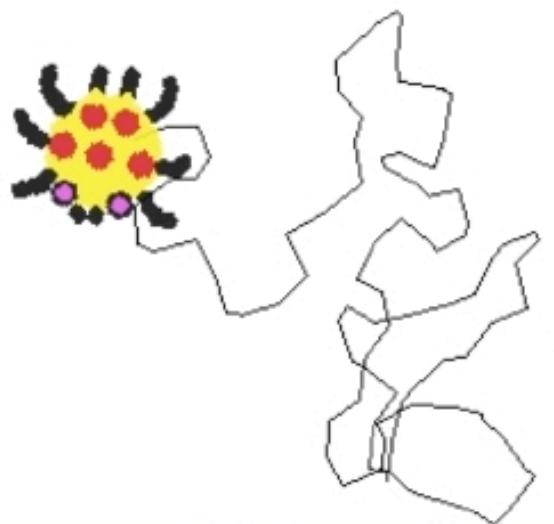
```
Bot Workspace
Do It All Do It Clear Trails Clear Bots Clear All
[bot 1]
bot => Bot new.
l = 10.
200 timesRepeat:
  [bot go: l.
  bot turn 90.
  l = l + 3]
```

A Method

```
square
```

```
  4 timesRepeat:  
    [ self go: 100.  
      self turn: 90 ]
```

```
Bot new square
```

Micro Browser: Bot

```
memory
operations
turning
variables
web
wandering:
```

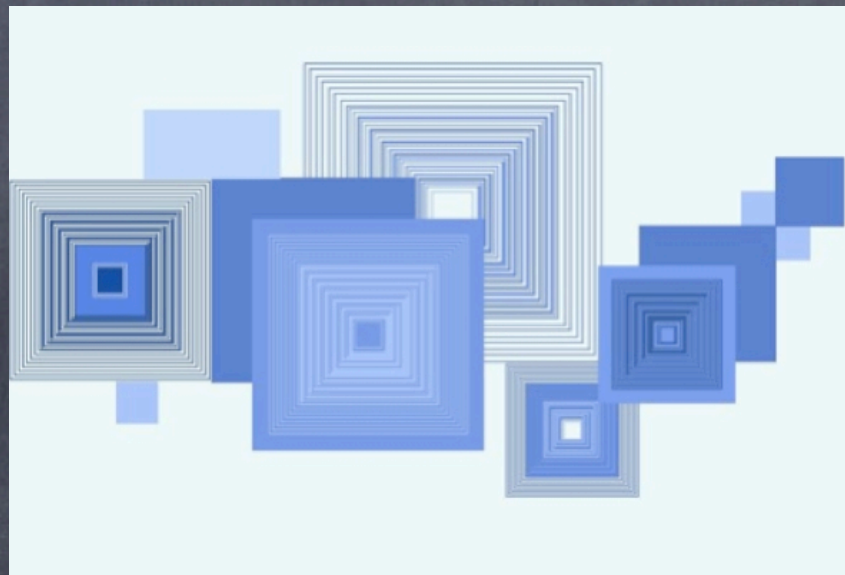
wandering: n
"Make the robot walking by a random length and turn randomly its direction n times"

```
| left |
n timesRepeat:
  [ self go: 20 atRandom.
    left = 2 atRandom.
    left = 1
      ifTrue: [ self turnLeft: 90 atRandom]
      ifFalse: [ self turnRight: 90 atRandom]]
```



The toolbar contains the following elements from top to bottom:

- Eraser and bucket tools.
- Red and yellow highlighters.
- Three black circles of increasing size for size selection.
- A vertical color gradient bar.
- Four buttons: "Undo", "Keep", "Clear", and "Toss".
- A 2x2 grid of color swatches (black, red, white, white).
- Two small icons at the bottom: a zoom-in icon and a zoom-out icon.



```

b penColor: (Color r: 0.2 g: 0.3 b: 0.5) .
b jumpTo: 500@260.
b northEast .
size = 1.
50 timesRepeat: [ b carreCentre2: size. size = size+1 ]

```

```

carreCouleur: size couleur: couleur
"carre de dimension size de tracé de couleur variable"
self penColor: couleur .
4 timesRepeat: [self go: size. self turnLeft: 90]

```

```

rond: size fois: fois couleur: couleur
fois timesRepeat: [self carreCouleur: size couleur: couleur. self
diagonaleD: 0.1. self turnLeft: 0.1].
b rond: 60 fois: 3600 couleur: (Color r: 0.7 g: 0.8 b: 0.1).

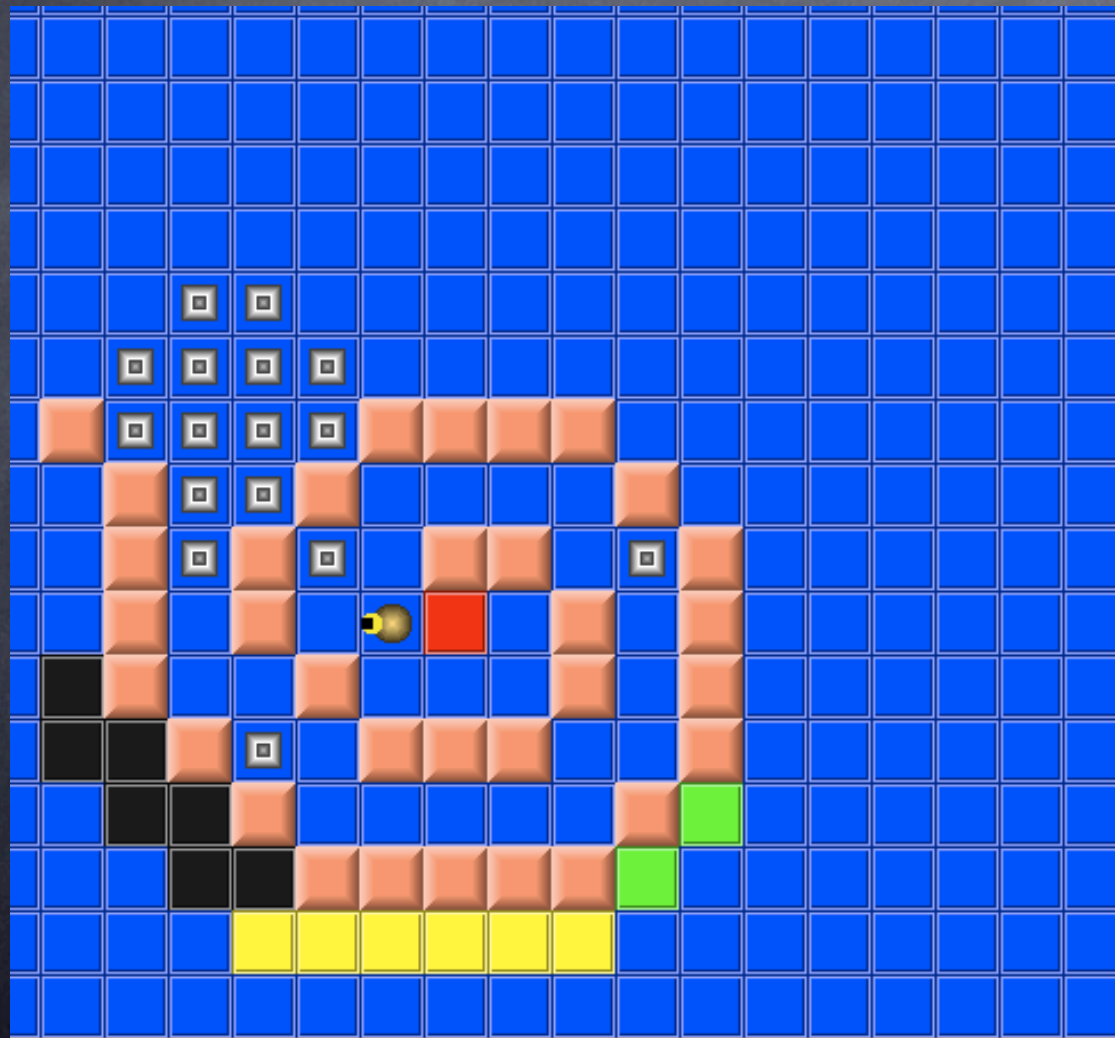
```




Next book?

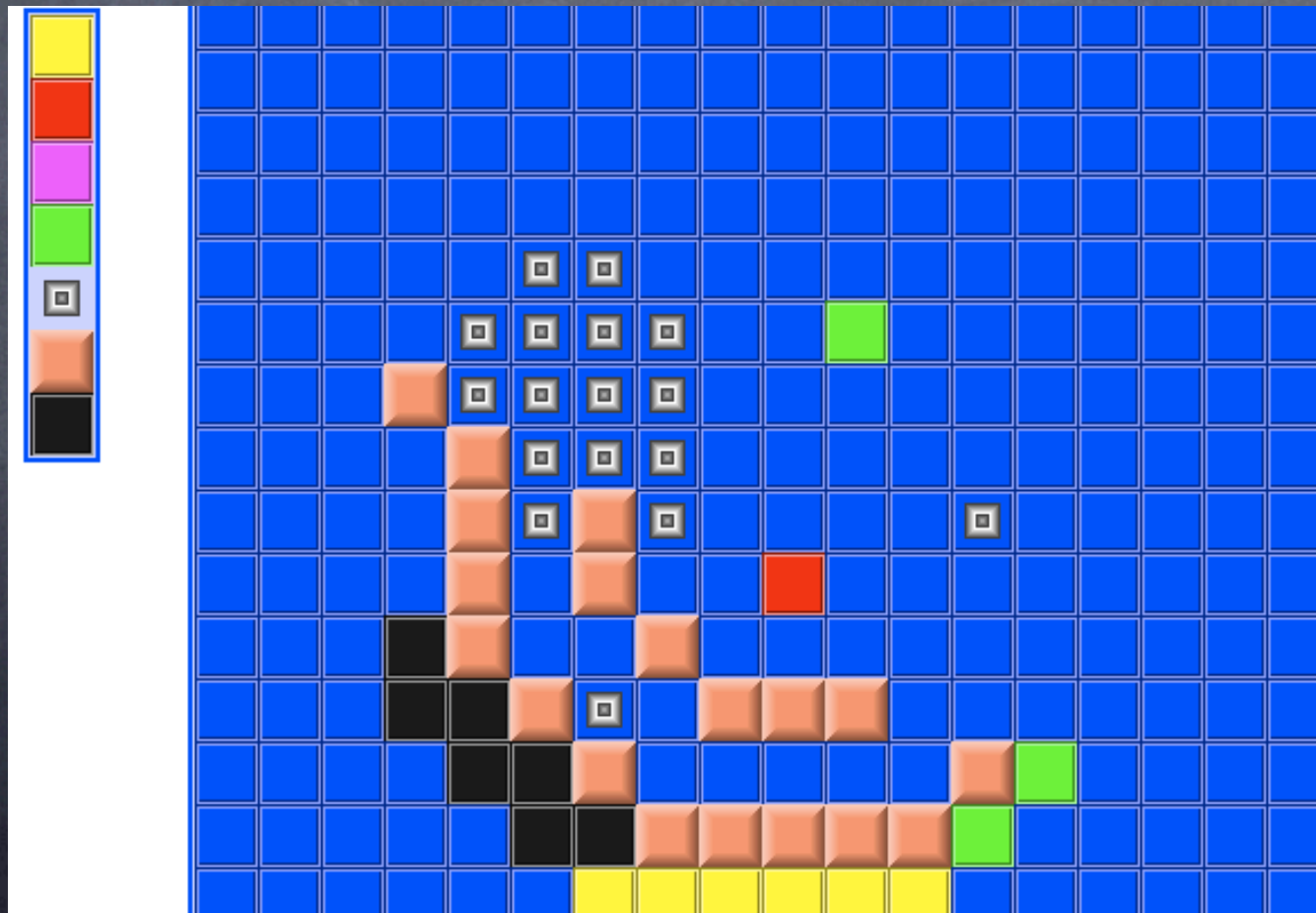
- If the first one sells well
- Miner robot:
 - escaping maze, following paths, recursion,
- Next book will be on object-oriented programming

Miner World



```
✕   
b2 west.  
b2 go
```

Editing the Bot World



Have fun...

- Tested at the French school of Berne
 - 11 to 15 years old
 - "I recently started a cours with 7th-graders (13) with Stephane's book --- they love it" Klaus Fuller - Germany
- smallwiki.unibe.ch/BotsInc