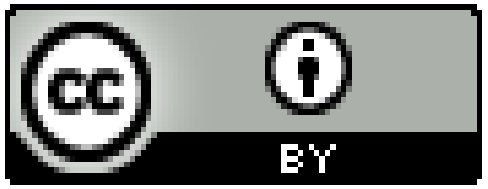
Classes and Objects

Introduction



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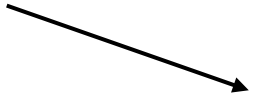

hide the details

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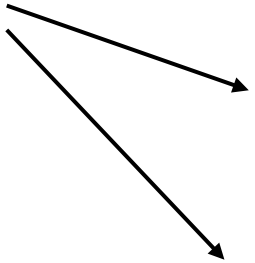

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make one thing act like another

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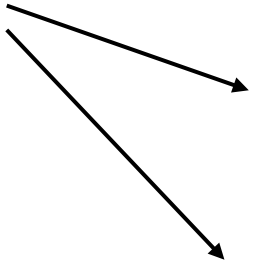

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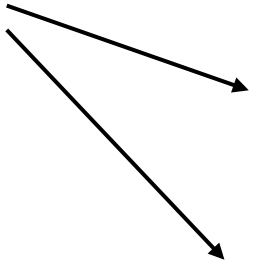

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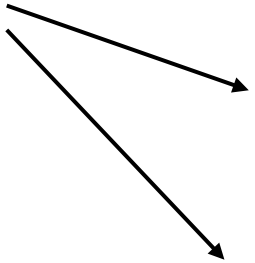

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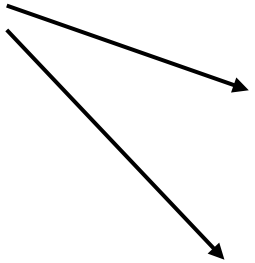

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make one thing act like another

Functions turn many steps into one (logical) step

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Classes and objects combine functions and data

And, if used properly, do much more as well

Simple simulation of aquarium containing

Simple simulation of aquarium containing plants

Simple simulation of aquarium containing

plants snails

Simple simulation of aquarium containing

plants snails fish

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plants snails fish

don't move

photosynthesize

Simple simulation of aquarium containing

plants	snails	fish
don't move	crawl in 2D	
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```
for t in
  range(timesteps):
  move(world,
  everything)
  eat(world,
  everything)
  show(world,
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for t in
  range(timesteps):
  move(world,
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  eat(world,
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  show(world,
```

Program is more complicated

```
def move(world, everything):
  for thing in everything:
    if thing[0] == 'plant':
      pass      # plants don't move
    elif thing[0] == 'snail':
      move_snail(snail)
    elif thing[0] == 'fish':
      move_fish(fish)
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So far, so good

```
def eat(world, everything):
  for thing in everything:
    if thing[0] == 'plant':
      photosynthesize(world, plant)
    elif thing[0] == 'snail':
      scavenge(world, snail)
    elif thing[0] == 'fish':
      prey = hunt(world, everything,
  thing)
      if prey != None:
        devour(world, everything,
  thing, prey)
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Hmm...  devour(world, everything,
  thing, prey)
```

```
def show(world, everything):
  show_world(world)
  for thing in everything:
    if thing[0] == 'plant':
      show_plant(plant)
    elif thing[0] == 'snail':
      show_snail(snail)
    elif thing[0] == 'fish':
      show_fish(fish)
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  show_world(world)
  for thing in everything:
    if thing[0] == 'plant':
      show_plant(plant)
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      show_snail(snail)
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This is starting to look familiar…

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What about fish that eat plants? Or scavenge?

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What about fish that eat plants? Or scavenge?

Optimist: every pattern in a program is an opportunity to shorten that program

Wouldn't this be simpler?

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```
for thing in everything:
  thing.move()
  prey = thing.eat(everything)
  if prey:
    thing.devour(prey)
    everything.remove(prey)
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Easier to understand (after some practice)

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Easier to understand (after some practice)

Much easier to add new kinds of things

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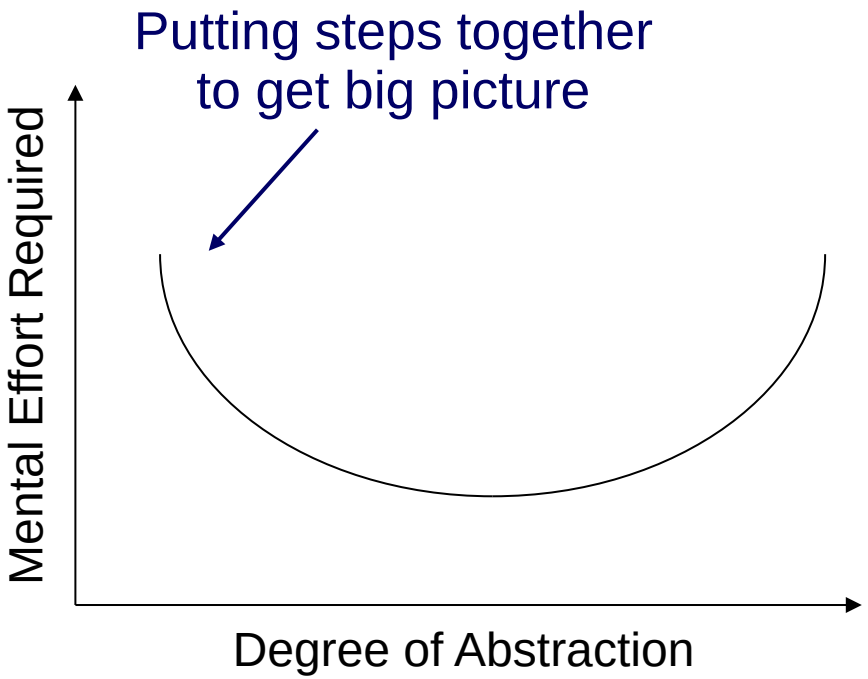

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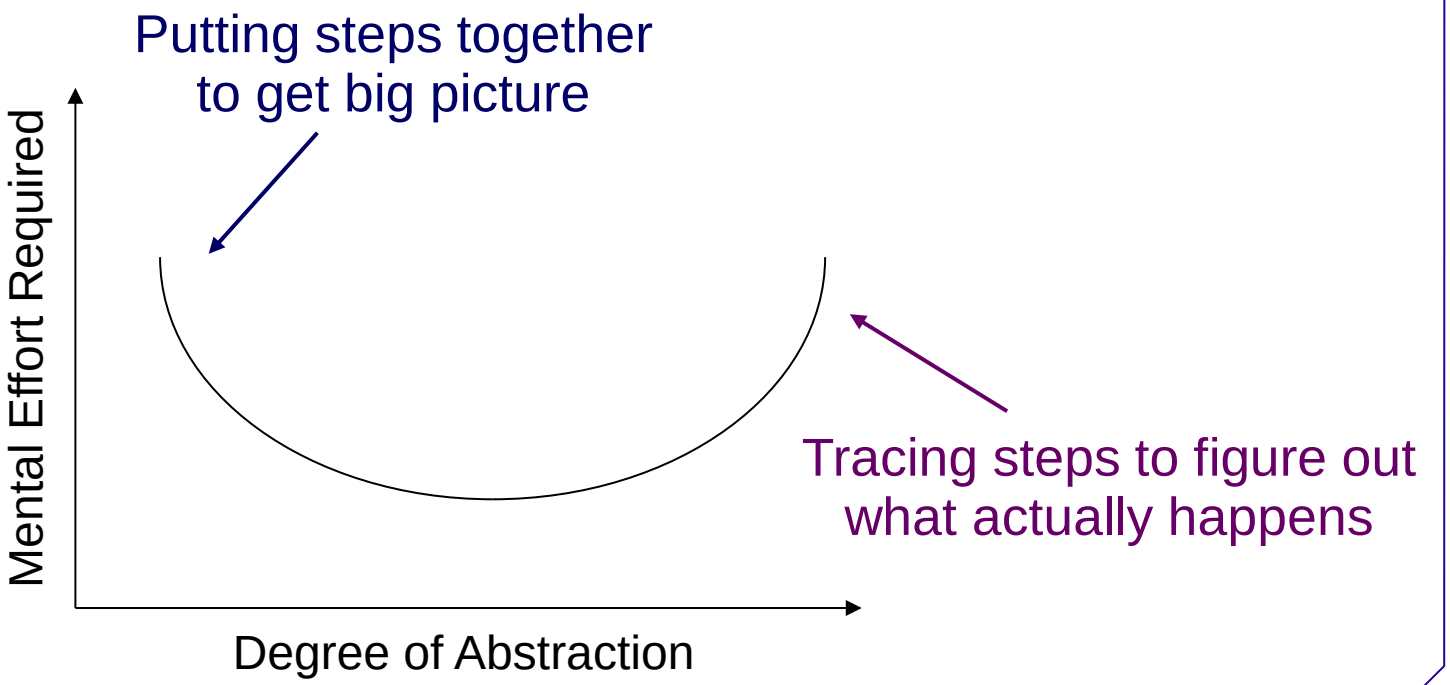

created by

Greg Wilson

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