



# The Beauty and Joy of Computing

## Lecture #17 Higher Order Functions

### Putting Watson to use for City Apps

The City of Surrey in British Columbia, Canada is the first city to use IBM's Watson technology as the basis for a new app, "My Surrey". The app has been described as 'Siri for local government' because of the ability for users to use natural language to find answers.

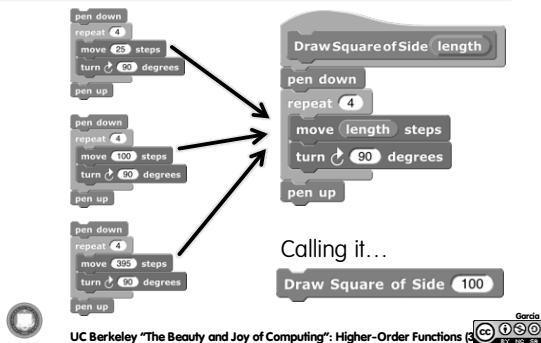


<http://www.prweb.com/releases/2015/07/prweb12862131.htm>

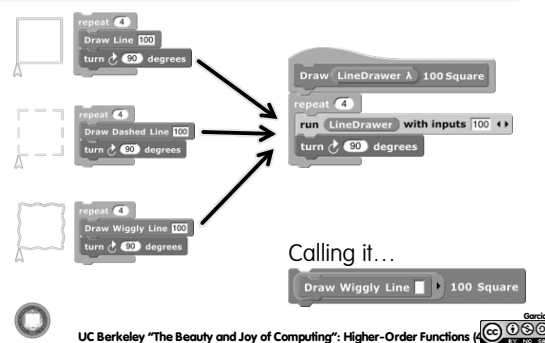
II

# Higher Order Functions... Why? Basics...

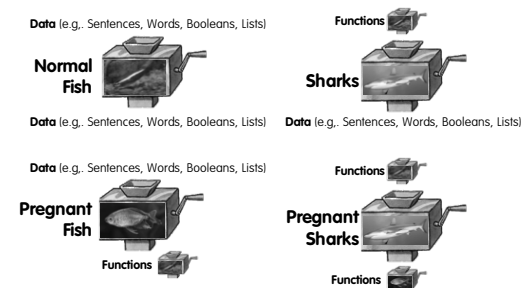
## Why Use Functions? (review)



## Why Use Higher-Order Functions?



## Why HOFs are like Pregnant Fish, Sharks



## HOFs you have seen before

### Useful HOFs (you can build your own!)

- map Reporter over List
  - Report a new list, every element  $E$  of  $List$  becoming  $Reporter(E)$
- keep items s.t. Predicate from List
  - Report a new list, keeping only elements  $E$  of  $List$  if  $Predicate(E)$
- combine with Reporter over List
  - Combine all the elements of  $List$  with  $Reporter(E)$
  - This is also known as "reduce"



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*bjc* **How combine works:**

combine with **Reporter** over **List**

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*bjc* **combine above the abstraction line**

(a b c d)  
combine using **f**  
a f b f c f d

Your **f** should be **associative**, and work if it's

(a f b) f (c f d)  
or...  
((a f b) f c) f d  
etc...

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*bjc* **Clicker Question**

What is reported here?

a) abcd  
b) acdb  
c) bdac  
d) dcba  
e) (nothing)

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**Acronym**

*bjc* **Acronym Algorithm**

(the Beauty and Joy of Computing)

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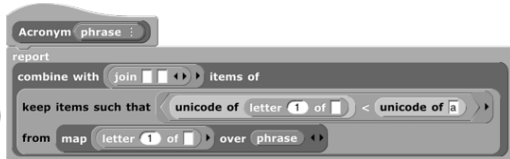
*bjc* **Acronym (uses map, keep, combine)**

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## *bjc* (Cal) Clicker Question

What is reported if I swap **keep** and **map** in Acronym and call it on (the Beauty and Joy of Computing)

- a) bjc
- b) BJC
- c) CJB
- d) (nothing)
- e) Error



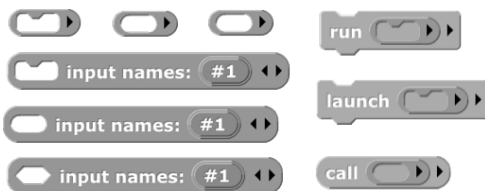
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## HOF Tools & Demo

## *bjc* HOF tools, sharks, pregnant fish, mymap



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