



The Beauty and Joy of Computing

Higher Order Functions I



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CODING IS COOL AGAIN!

The market for classes in coding (esp focused on the Internet) is booming, so says the NY Times. Codecademy is one of the biggest sites; CS10 is a great first step!!

(Image Credit: New York Times)



<http://www.nytimes.com/2012/03/28/technology/for-an-edge-on-the-internet-computer-code-gains-a-following.html>

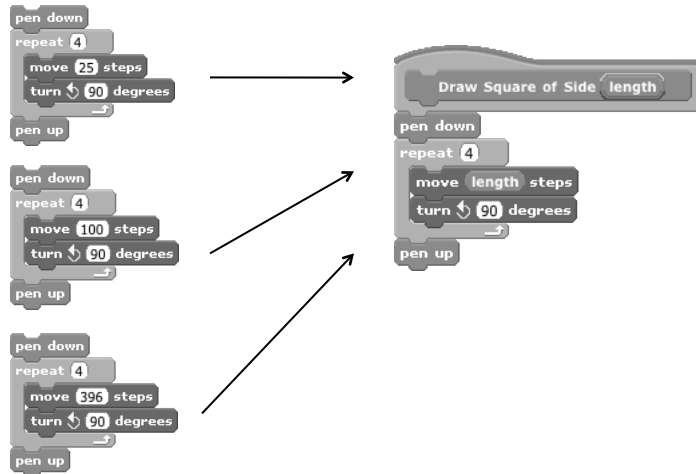


Midterm Results (paper only)





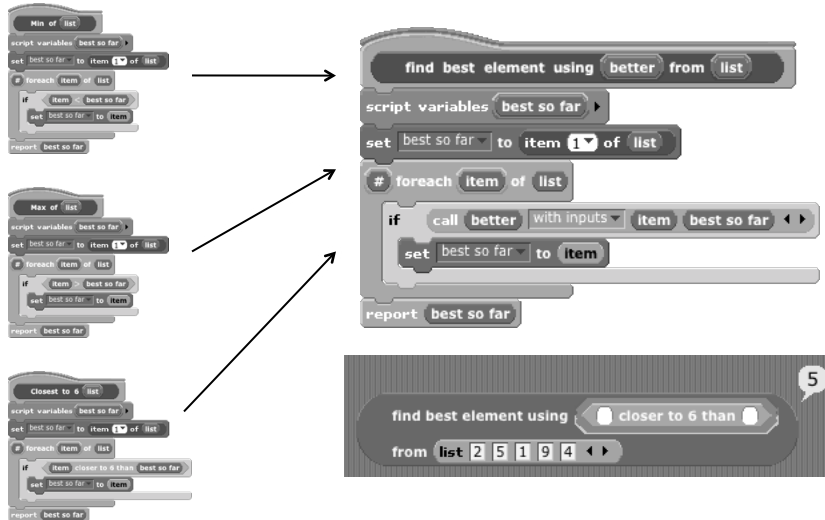
Why use functions? (review)



The power of generalization!



But how general can we be?



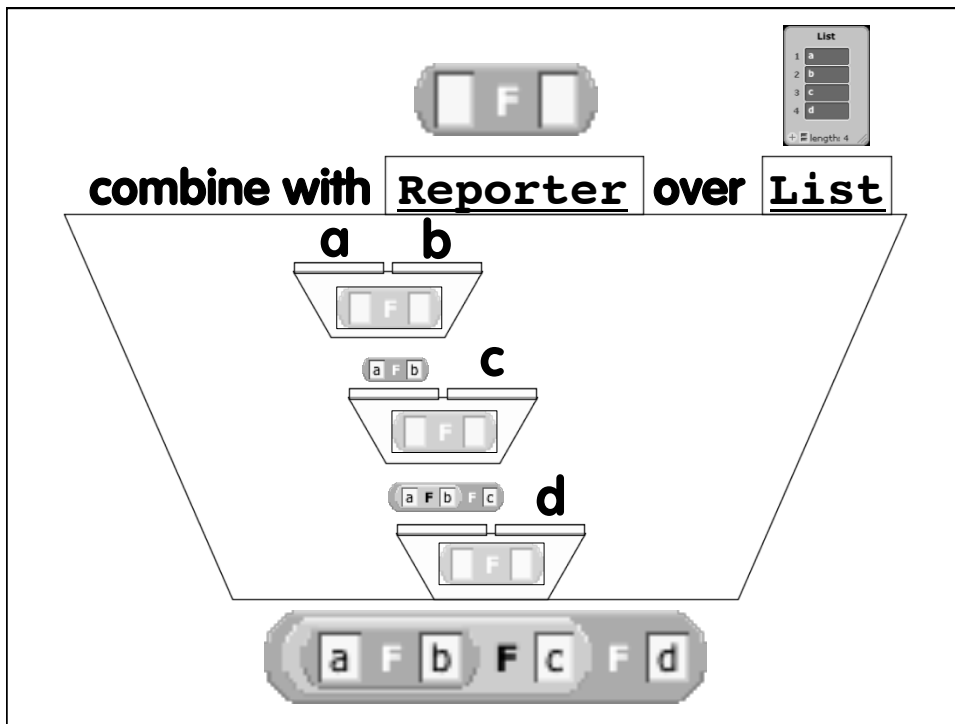
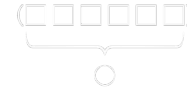
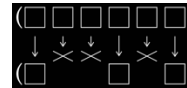
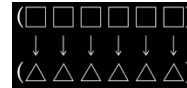
The power of generalization!





Today

- **Functions as Data**
- **Higher-Order Functions**
- **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 such that 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"
- **Acronym example**
 - keep → map → combine





Peer Instruction



I understand higher-order functions.

- a) Strongly disagree
- b) Disagree
- c) Neutral
- d) Agree
- e) Strongly agree



Summary

- Functions as data is one of the two (programming) big ideas in this course
- It's a beautiful example of the abstraction of the list iteration details
- Google (and other companies) use this!
 - They use "map-reduce"

(Image Credit: *Simply Scheme* by Brian Harvey & Matt Wright)



Turning function machines into plowshares

