

Abstraction

- **Detail removal**
 - "The act or process of leaving out of consideration one or more properties of a complex object so as to attend to others."
- **Generalization**
 - "The process of formulating general concepts by abstracting common properties of instances"



Henri Matisse "Naked Blue IV" © 2011



Detail Removal



Automatic Generation of Detail Maps
Maneesh Agrawala (UCB EECS), among others



Detail Removal (in CS10)

- You'll want to write a project to simulate a real-world situation, or play a game, or ...
- Abstraction is the idea that you focus on the essence, the cleanest way to map the messy real world to one you can build

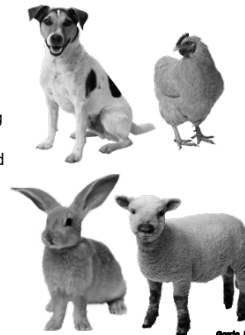


The London Underground 1928 Map & the 1933 map by Harry Beck.



Generalization Example

- You have a farm with many animal kinds.
- Different food for each
- You have directions that say
 - To feed dog, put dog food in dog dish
 - To feed chicken, put chicken food in chicken dish
 - To feed rabbit, put rabbit food in rabbit dish
 - Etc...
- How could you do better?
 - To feed <animal>, put <animal> food in <animal> dish



Generalization (in CS10)

- You are going to learn to write functions, like in math class:

$$y = \sin(x)$$

- You should think about what inputs make sense to use so you don't have to duplicate code



"Function machine" from *Simply Scheme* (Harvey)



Summary

- Abstraction is one of the big ideas of computing and computational thinking
- Think about driving. How many of you know how a car works? How many can drive a car? Abstraction!



Someone who died in 1930 could still drive a car today because they've kept the same Abstraction!
(right pedal faster, left pedal slow)

