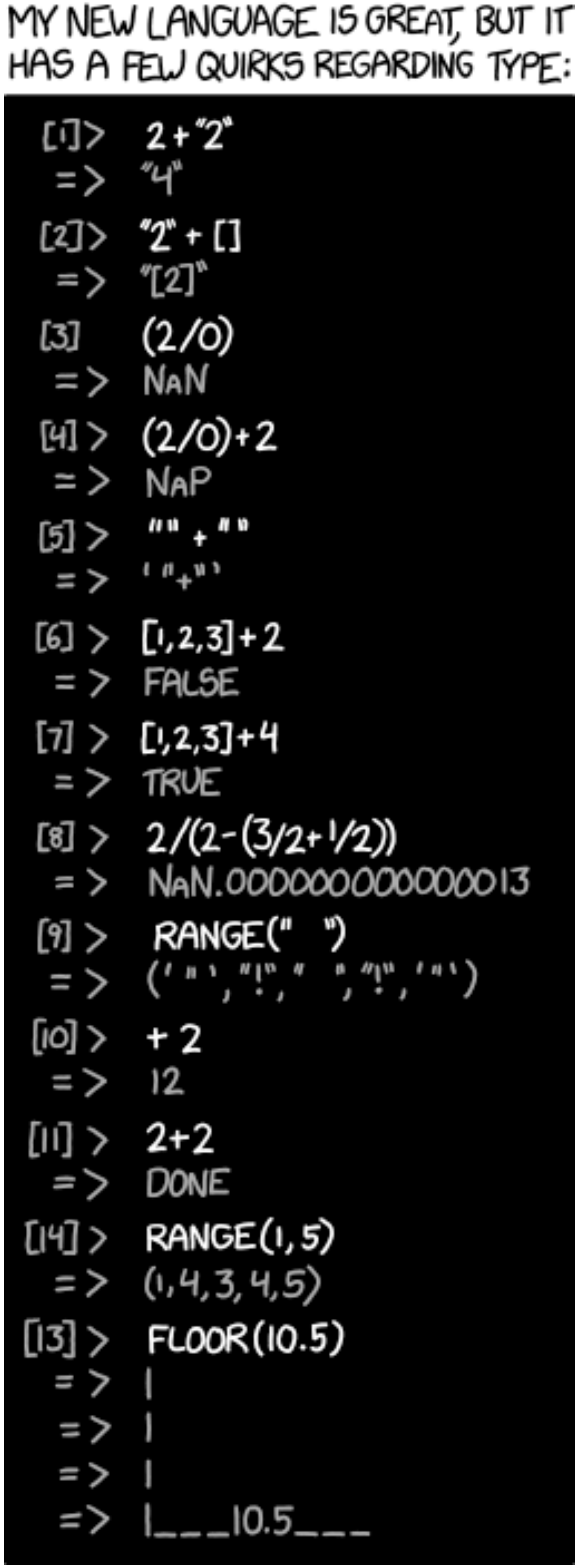
CSCI 141

Scott Wehrwein

Data: Types and Values


MY NEW LANGUAGE IS GREAT, BUT IT HAS A FEW QUIRKS REGARDING TYPE:

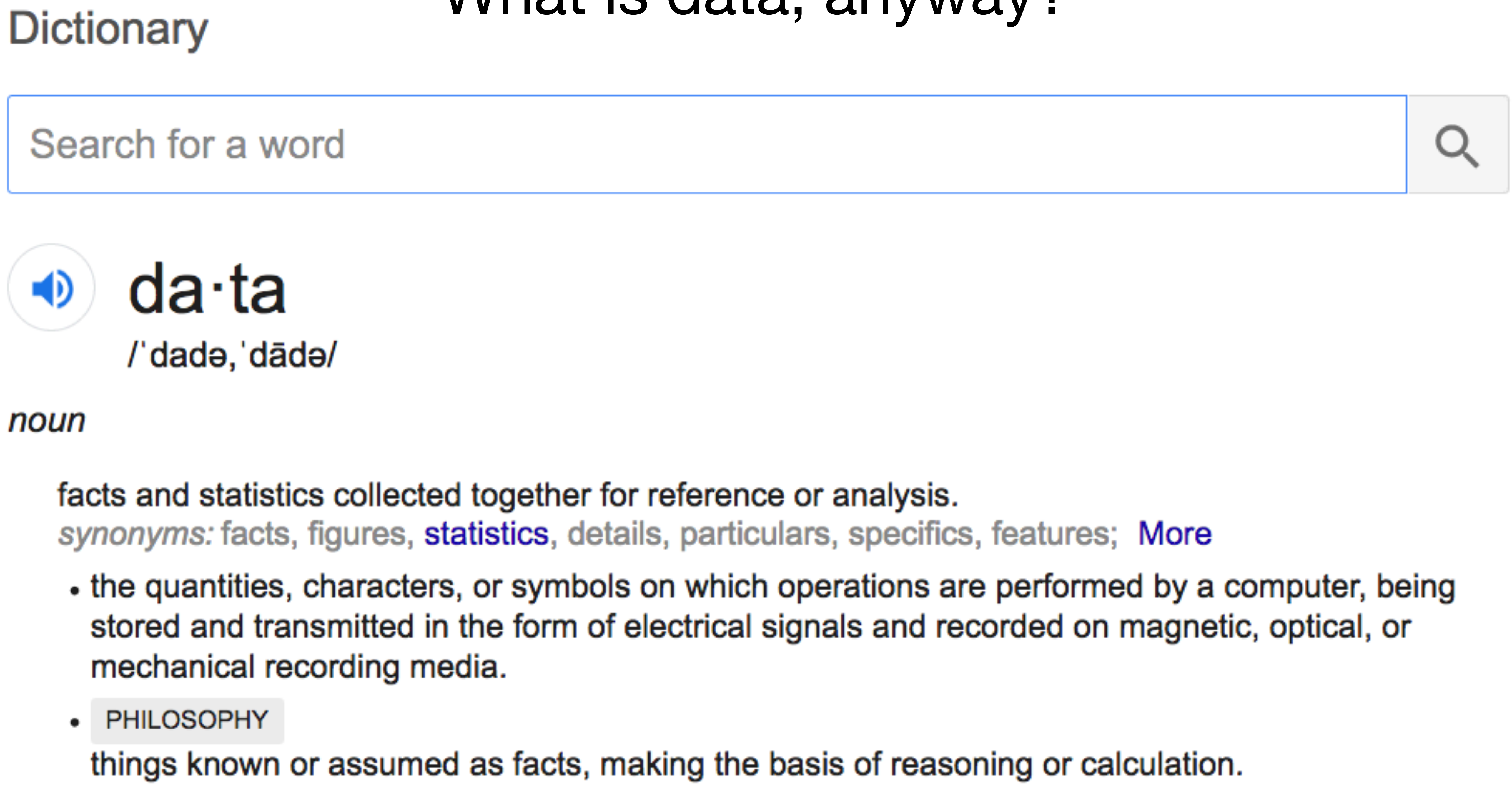
```
[1]>  2+"2"
  =>  "4"
[2]>  "2"+[]
  =>  "[2]"
[3]   (2/0)
  =>  NaN
[4]>  (2/0)+2
  =>  NaP
[5]>  ""+""
  =>  '"+"'
[6]>  [1,2,3]+2
  =>  FALSE
[7]>  [1,2,3]+4
  =>  TRUE
[8]>  2/(2-(3/2+1/2))
  =>  NaN.0000000000000013
[9]>  RANGE(" ")
  =>  ('"',"!"," ","!",'"')
[10]> +2
  =>  12
[11]> 2+2
  =>  DONE
[14]> RANGE(1,5)
  =>  (1,4,3,4,5)
[13]> FLOOR(10.5)
  =>  |
  =>  |
  =>  |
  =>  |___10.5___
```

Goals

- Know that different kinds of data are represented on a computer in different ways
- Know the meaning of the following types:
  - `str`, `int`, `float`
- Know how to use the type conversion functions `int`, `float`, `str`
- Know how to use the `type` function.

Data

What is data, anyway?



Dictionary

da·ta

/ˈdadə,ˈdādə/

noun

facts and statistics collected together for reference or analysis.

synonyms: facts, figures, statistics, details, particulars, specifics, features; More

- the quantities, characters, or symbols on which operations are performed by a computer, being stored and transmitted in the form of electrical signals and recorded on magnetic, optical, or mechanical recording media.
- PHILOSOPHY
  things known or assumed as facts, making the basis of reasoning or calculation.

Data: Types and Values

Every piece of data has a **value**.

A value is a concrete piece of data,
such as a number, or a character.

"a" "Scott"

4 6.2

Data: Types and Values

- Different kinds of data are stored differently.
- Every piece of data also has a **type** (sometimes called **class**)
- We've seen 2 already:
  - "Hello world!" String (type `str`) - a sequence of characters
  - 3 (as in 3 * 4 + 2) Integer (type `int`) - an integer (whole number)
- Here's another:
  - 3.14 Floating-point number (type `float`): a number with a decimal point

Data Types: Why?

- All pieces of data have a **type** (sometimes also called **class**)

- Practical reasons:

  - Need to know how to store it in memory (how to encode it as 1's and 0's)

  - Need to know what you can *do* with it
    - can you compute `10 + "Scott"`?
    - what about `1.1 + 2`?

Data Types

- How do you find out what type a piece of data is?
  - Just ask! Python has a function called `type` which tells you the type, or class, of any value.

The `type` Function

- The type function takes one piece of data (a value) and gives back the type of the value.

- Examples:

Function call:	Result:
`type(16)`	`<class ‘int’>`
`type(“CSCI 141”)`	`<class ‘str’>`
`type(16.0)`	`<class ‘float’>`

16.0 is (mathematically) an integer, but the decimal point causes it to be interpreted as a `float`.

Data Type Conversions

- What if you have `“1.4”` (class `str`) but you want `1.4` (class `float`)?

- Here are three more functions:

```
int()

float()

str()
```

- Each tries to convert its argument to the given type, and throws an error if it’s not possible.

`type` and type conversions: demo

`type` and type conversions: demo

- type function
- int to int
- int to string
- float to int
- string to int
- string to float