

Part 2.3:

Python: Flow Control, Conditional Statements, and Dictionaries



Dana L Carper and Travis J Lawrence
Quantitative and Systems Biology
University of California, Merced

Flow Control

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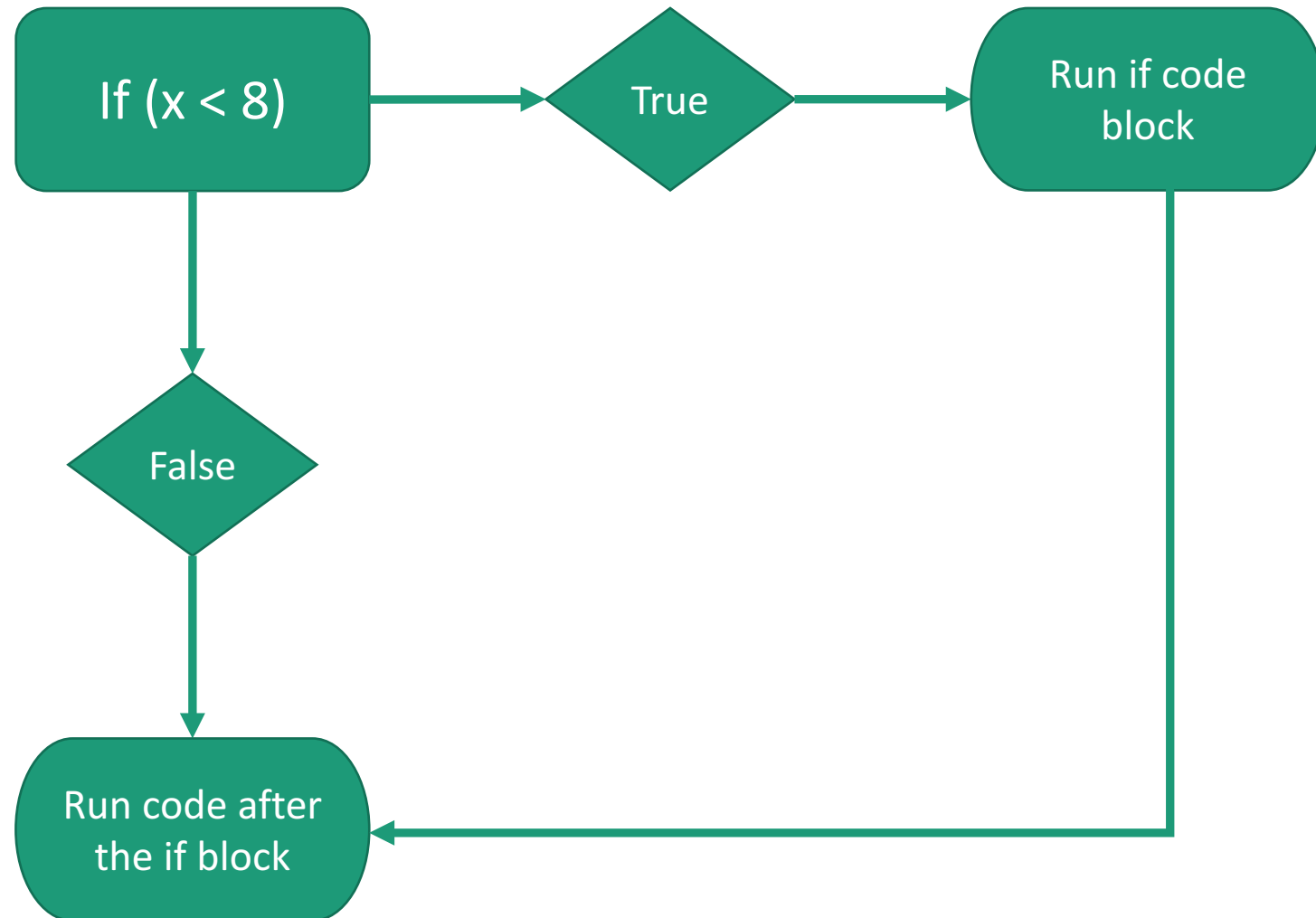
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 - Loops

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- We have already introduced you to one method of flow control
 - loops
 - If/elif/else statements

Flow Control: if statements



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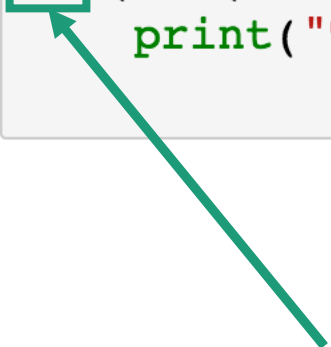
- if statement example

```
families = ['Plantaginaceae', 'Lamiaceae', 'Orobanchaceae']  
if (len(families) < 4):  
    print("There are less than three families")
```


Flow Control: if statements

- if statement example

```
families = ['Plantaginaceae', 'Lamiaceae', 'Orobanchaceae']  
if (len(families) < 4):  
    print("There are less than three families")
```




All if statements must begin with the keyword `if`.

Flow Control: if statements

- if statement example

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families = ['Plantaginaceae', 'Lamiaceae', 'Orobanchaceae']  
if (len(families) < 4):  
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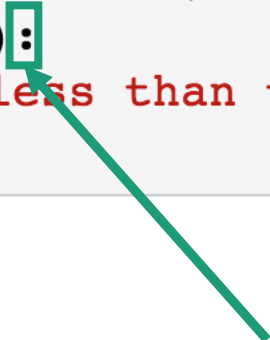


The conditional statement is surrounded by parenthesis.

Flow Control: if statements

- if statement example

```
families = ['Plantaginaceae', 'Lamiaceae', 'Orobanchaceae']  
if (len(families) < 4):  
    print("There are less than three families")
```




A colon marks the beginning of an indented code block.

Flow Control: if statements

- if statement example

```
families = ['Plantaginaceae', 'Lamiaceae', 'Orobanchaceae']  
if (len(families) < 4):  
    print("There are less than three families")
```



Indented code block that is executed if the conditional statement is True
(four spaces are used to indent the block)

Flow Control: if statements

- if statement example

```
families = ['Plantaginaceae', 'Lamiaceae', 'Orobanchaceae']  
if (len(families) < 4):  
    print("There are less than three families")
```

- Results

Flow Control: if statements

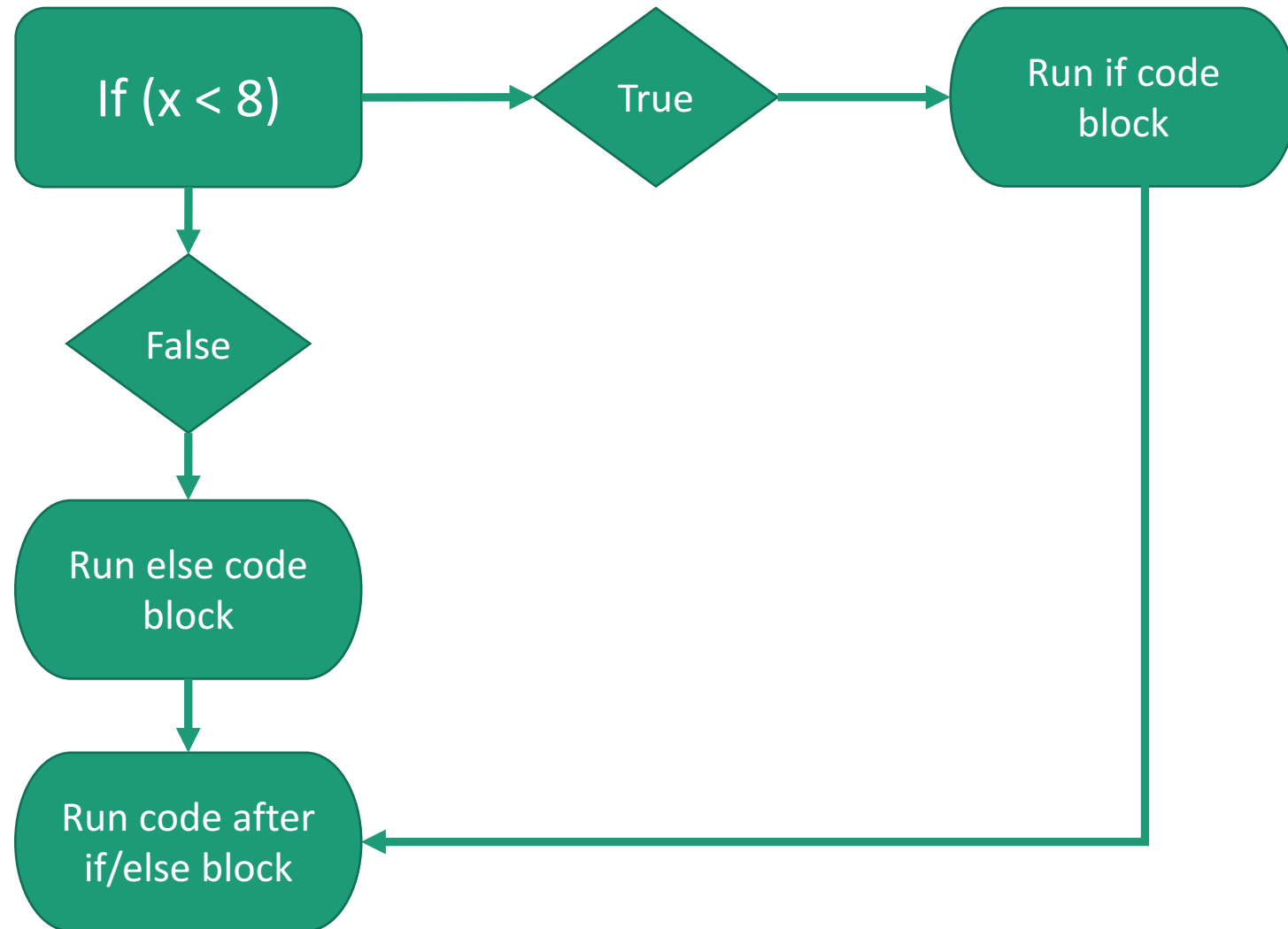
- if statement example

```
families = ['Plantaginaceae', 'Lamiaceae', 'Orobanchaceae']  
if (len(families) < 4):  
    print("There are less than three families")
```

- Results

```
"There are less than three families"
```

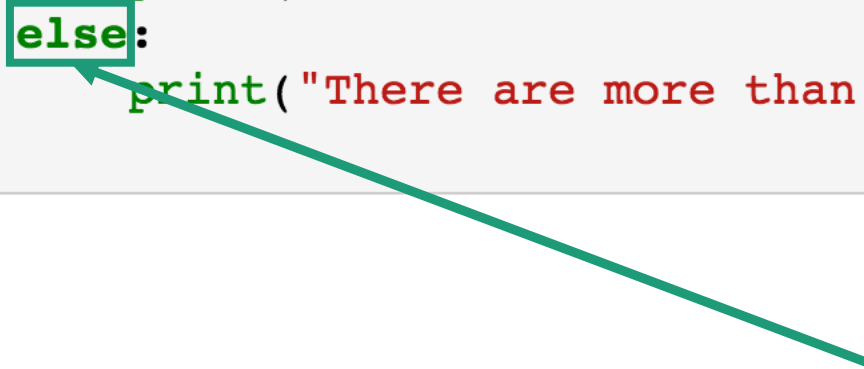
Flow Control: else statements



Flow Control: else statements

- If/else statement example

```
families = ['Plantaginaceae', 'Lamiaceae', 'Orobanchaceae']  
if (len(families) < 2):  
    print("There are less than three families")  
else:  
    print("There are more than two families")
```




Else statement keyword. This indicates the beginning of an else statement. This is followed by a colon to mark the start of an indented code block.

Flow Control: else statements

- If/else statement example

```
families = ['Plantaginaceae', 'Lamiaceae', 'Orobanchaceae']  
if (len(families) < 2):  
    print("There are less than three families")  
else:  
    print("There are more than two families")
```



Indented code block that is executed when the conditional statement of the if block is False.
(four spaces are used to indent the block)

Flow Control: else statements

- If/else statement example

```
families = ['Plantaginaceae', 'Lamiaceae', 'Orobanchaceae']  
if (len(families) < 2):  
    print("There are less than three families")  
else:  
    print("There are more than two families")
```

- Results

Flow Control: else statements

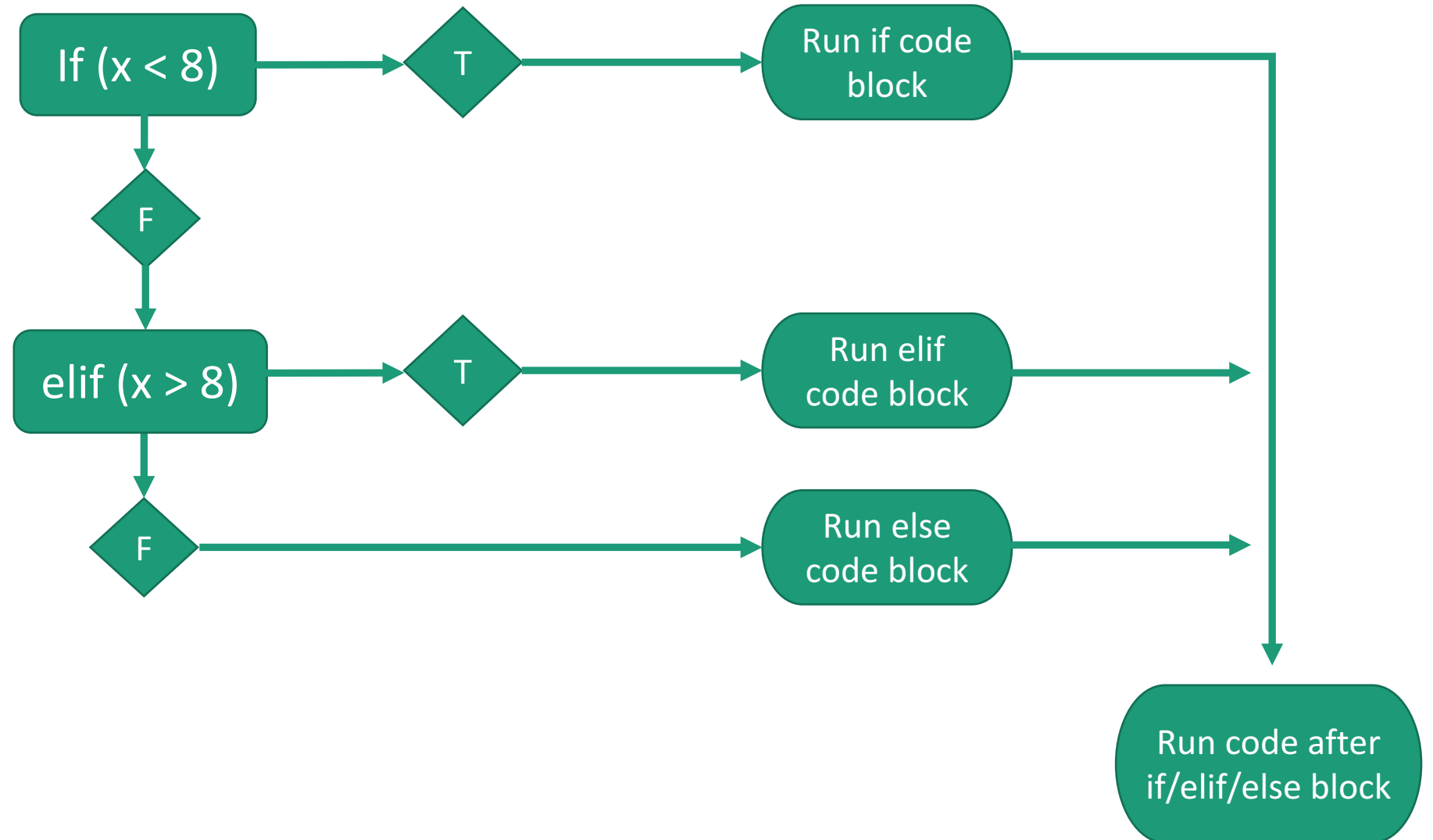
- If/else statement example

```
families = ['Plantaginaceae', 'Lamiaceae', 'Orobanchaceae']  
if (len(families) < 2):  
    print("There are less than three families")  
else:  
    print("There are more than two families")
```

- Results

```
"There are less than two families"
```

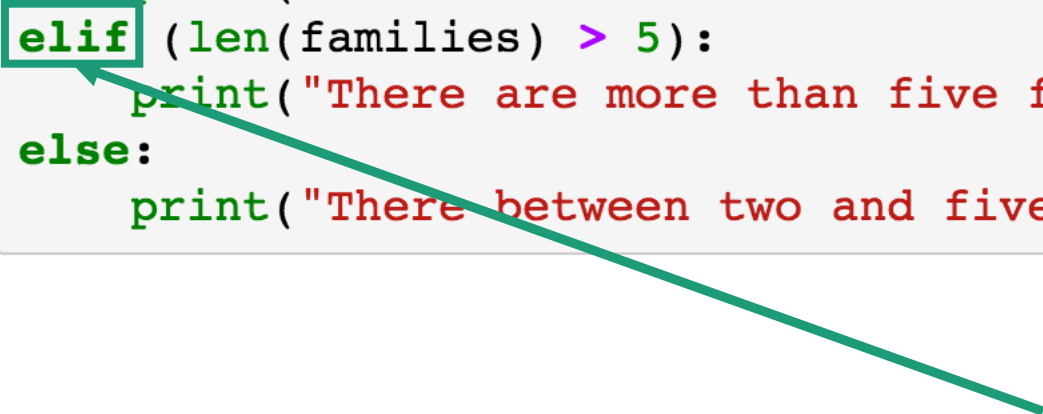
Flow Control: elif statements



Flow Control: elif statements

- If/elif/else statement example

```
families = ['Plantaginaceae', 'Lamiaceae', 'Orobanchaceae']  
if (len(families) < 2):  
    print("There are less than three families")  
elif (len(families) > 5):  
    print("There are more than five families")  
else:  
    print("There between two and five families")
```



Keyword indicating the start of an else if statement. This is followed by a conditional statement and a colon to begin the indented block. The indented block is executed only if the previous if and else if statements were False.

Flow Control: elif statements

- If/elif/else statement example

```
families = ['Plantaginaceae', 'Lamiaceae', 'Orobanchaceae']  
if (len(families) < 2):  
    print("There are less than three families")  
elif (len(families) > 5):  
    print("There are more than five families")  
else:  
    print("There between two and five families")
```

- Results

Flow Control: elif statements

- If/elif/else statement example

```
families = ['Plantaginaceae', 'Lamiaceae', 'Orobanchaceae']  
if (len(families) < 2):  
    print("There are less than three families")  
elif (len(families) > 5):  
    print("There are more than five families")  
else:  
    print("There between two and five families")
```

- Results

```
"There between two and five families"
```

Conditional Expressions

- > greater than
- >= greater than or equal
- < less than
- <= less than or equal
- == equal
- not
- or
- and

Booleans

- Booleans are a type of variable that can be set to either True or False
- Conditional expressions return a booleans

Conditional Expressions: membership testing

- The keyword 'in' is used for membership testing.
- This is used to test if a value is present in a Python collection (e.g. list)
- Example:

```
families = ['Plantaginaceae', 'Lamiaceae', 'Orobanchaceae']  
if ("Plantaginaceae" in families):  
    print("We have samples from Plantaginaceae")
```

- Result:

Conditional Expressions: membership testing

- The keyword 'in' is used for membership testing.
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- Example:

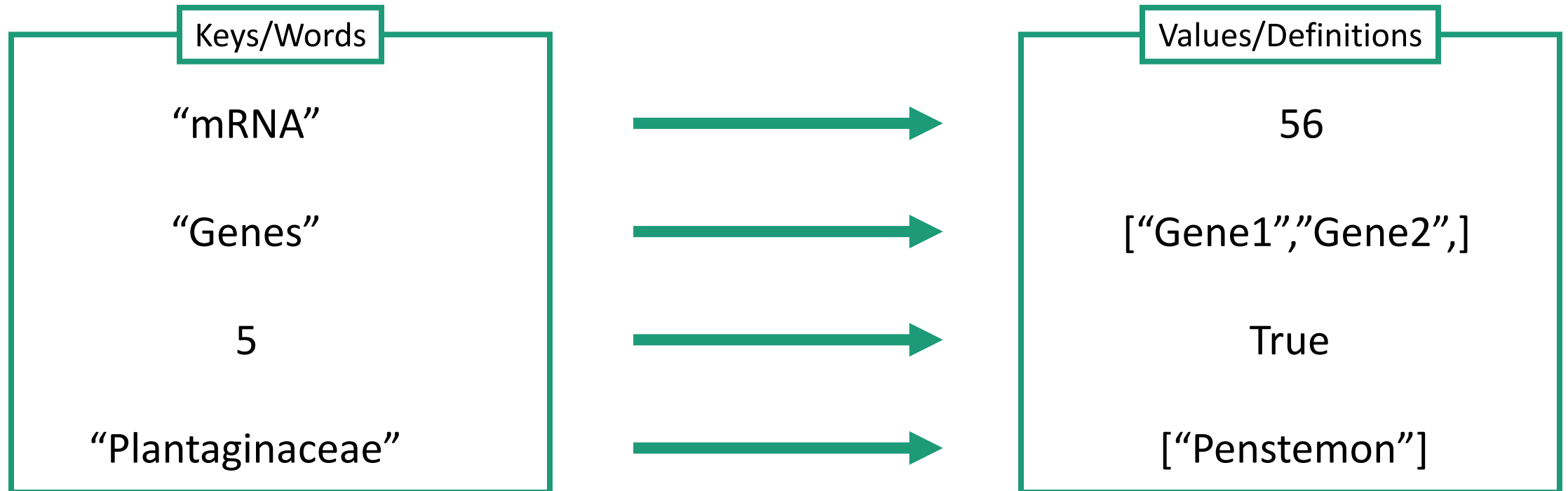
```
families = ['Plantaginaceae', 'Lamiaceae', 'Orobanchaceae']  
if ("Plantaginaceae" in families):  
    print("We have samples from Plantaginaceae")
```

- Result:

```
"We have samples from Plantaginaceae"
```

Data Structure: Dictionary

- Dictionaries consist of key:value pairs
- Keys can be any kind of variable but must be unique
- Values can be any kind of variable including another dictionary



Data Structure: Dictionary

- Creating a dictionary

```
example = {"mRNA":56, "Genes":["Gene1","Gene2"], 5:True, "Plantaginaceae":["Penstemon"]}
```

When creating a dictionary the key:value pairs are surrounded by curly braces

Data Structure: Dictionary

- Creating a dictionary

```
example = {"mRNA":56, "Genes":["Gene1","Gene2"], 5:True, "Plantaginaceae":["Penstemon"]}
```

Keys and their values are separated with a colon



Data Structure: Dictionary

- Creating a dictionary

```
example = {"mRNA":56, "Genes":["Gene1", "Gene2"], 5:True, "Plantaginaceae":["Penstemon"]}
```



Key:value pairs are separated by commas

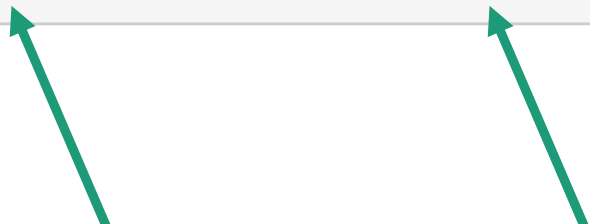
Data Structure: Dictionary

- Creating a dictionary

```
example = {"mRNA":56, "Genes":["Gene1","Gene2"], 5:True, "Plantaginaceae":["Penstemon"]}
```

- Accessing Values

```
example["mRNA"] #56  
example["Plantaginaceae"] #[ "Penstemon" ]
```



To access the value of a key use the dictionary's name followed by the key enclosed by square brackets .

Data Structure: Dictionary

- Creating a dictionary

```
example = {"mRNA":56, "Genes":["Gene1", "Gene2"], 5:True, "Plantaginaceae":["Penstemon"]}
```

- Accessing Values

```
example["mRNA"] #56  
example["Plantaginaceae"] #["Penstemon"]
```

- Updating and adding new key:value pairs

```
example["mRNA"] = 57 #57  
example["Plantaginaceae"].append("Plantago") #["Penstemon", "Plantago"]  
example["new key"] = "new value"
```