

# Hierarchical Data Structures

*October 4, 2018*

---

# What are types?

---

Is there a difference between datatypes and data structures?

What makes a language statically typed?

Do all programming languages have types?

---

# What are types?

---

Types define an ontology

**Ontology:**

"What exists?"

"What is a thing?"

"What categories can we sort existing things into?"

---

# How are Booleans defined?

---

Well, there are only two, right?

We could just list them:

`#t`

`#f`

---

# How are numbers defined?

---

- ❖ Can we list them?

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, ...

- ❖ We could write a recursive definition (also called an **inductive** definition):

0 is a number

if  $x$  is a number then  $x + 1$  is a number