Semantics and pragmatics

LING 200: Introduction to the Study of Language

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March 2016

An important correction!

- The midterm will cover everything we studied since the previous midterm, **including writing systems and the mental lexicon**!

Outline

1. Modeling meanings
   - Sentences
   - Predicates
   - Modeling connectives and determiners
2. Modification
   - Intersective adjectives
   - Gradable adjectives
   - Ordering ambiguities

Slides credit: Jessica Coon, Rebecca Starr

Recall. . .

Truth conditions

To know the **meaning** of a sentence is to know the *conditions under which it is true*, known as "truth conditions"

Truth conditions are. . .

- . . . what it would take for the sentence to be true or false, what the world would need to be like in order for the sentence to be true or false

➽ **Note:** we don't have to know *whether* the sentence is true or false to know its truth conditions

(1) a. It snowed 4 centimeters in Toronto yesterday.
b. A gallon of pure maple syrup weighs 11 pounds.
c. The smallest city park in the U.S. is in Texas.

Recall. . .

The extension and intention of a sentence

- The **intension** of a sentence = its meaning = its **truth conditions**
- The **extension** of a sentence in a given situation = its **truth value** (**True** or **False**) in that situation

- This means that lots of sentences have the same *extension*, although they have different *intensions*.
- True sentences:
  - Justin Trudeau is the prime minister of Canada.
  - France is in Europe.
  - Hydrogen is the lightest element in the periodic table.
  - . . .
- False sentences:
  - It's 2036.
  - Justin Trudeau is the president of the United States.
  - Hadas hates cats.
  - . . .

Recall. . .

Verification strategies

To determine the truth value of a sentence, we need to come up with a **verification strategy**.

A verification strategy is. . .

- . . . one particular way in which we can find out whether the truth conditions of a sentence hold in a given context or situation.

How would you verify the truth value of. . .

- It snowed 4 centimeters in Toronto yesterday.
- The name of the student sitting closest to the front door starts with a "D."
- There is life on Mars.

Predicates

Predicates:

Predicates are lexical heads with their complements (if any) —VPs

- *purr, read the newspaper, study Linguistics, watch a movie*
- *be furry, be black, be intelligent, be tall*
- *be a cat, be a student of linguistics, be a basketball player, be from Canada*

Predicates

The extension and intension of predicates

- The **intension** of a predicate = its meaning = the conditions under which it applies to entities
- The **extension** of a predicate in a given situation = the set of entities it applies to in that situation

Penguins *have wings*

- **intension**: true of an entity if and only if it has wings.
- **extension**: all the entities in the world that actually have wings.
  - chickens, robins, ostriches, hawks, mosquitoes...
  - Pegasus? airplanes? buildings?

Predicates

Venn diagrams

We can use Venn diagrams to describe the entities that a predicate is true of.

Modeling sentences

Predicates

- Let's think of the sentences:
  (a) Cara is black
  (b) Cara is a cat
  (c) Cara purred
- We can think of predicates as mathematical **sets** of individuals.

A **set** is a collection of objects.

- **Purred** is the collection of all individuals who purred.
- **Black** is the collection of all black individuals.
- **Cat** is the collection of all individuals who are cats.

Modeling sentences

Predicates

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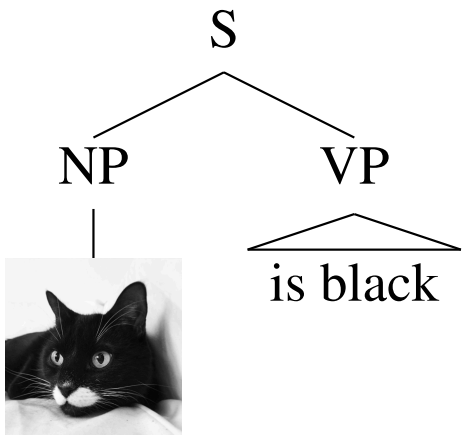

Cara is a **member** of (or: belongs to) the set of individuals that are **black**.

Modeling sentences

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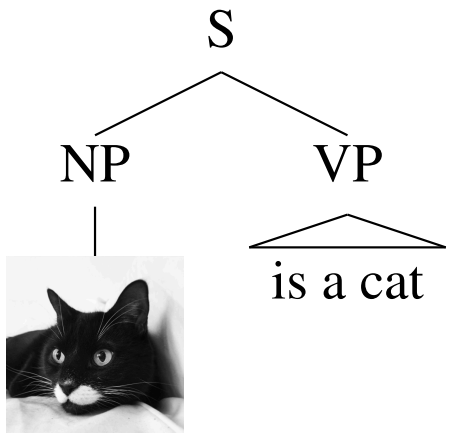

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Modeling sentences

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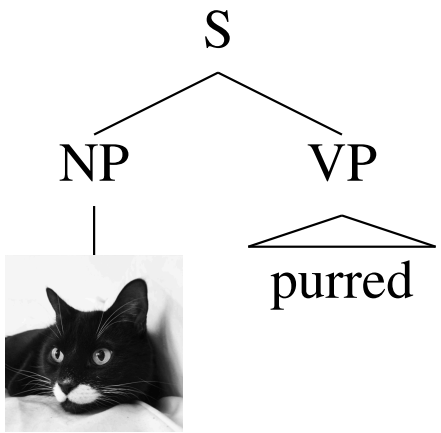


Cara is a **member** of (or: belongs to) the set of individuals that **purred**.

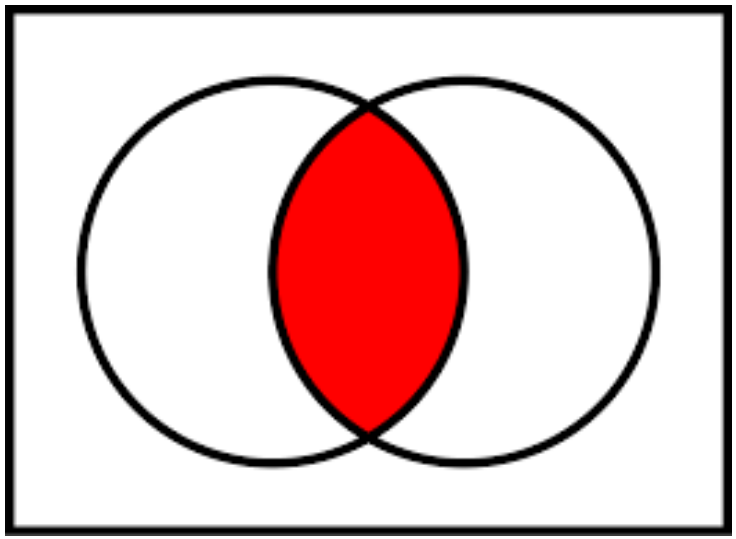
Modeling sentences

Predicates

- Now let's think about the slightly more complex sentence:
  Cara is a black cat

Cara is a **member** of the set of individuals that are **black** *and* a **member** of the set of individuals that are **cats**.

- **Set intersection**: The set that results from collecting all the individuals that belong to two other sets.



Predicates

Venn diagrams

The **intersection** of the predicate *have wings* and the predicate *be extinct* includes, among other things, dodos:

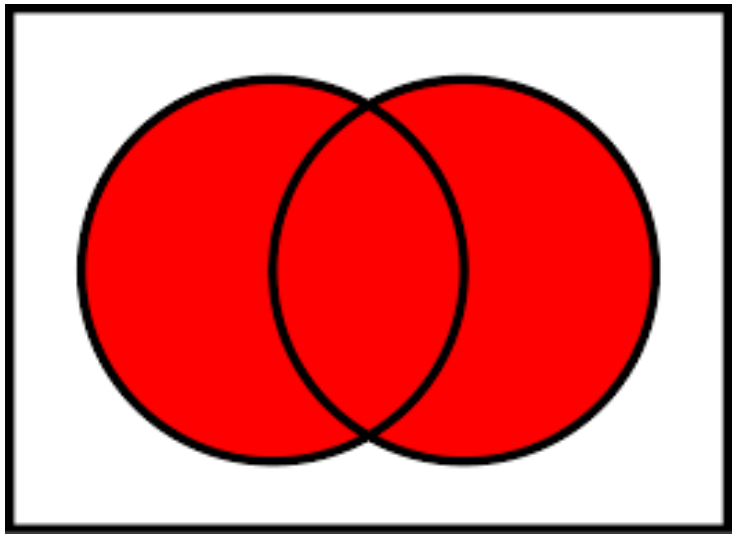
Modeling sentences

Predicates

- Now let's think about the slightly more complex sentence:
  Cara is a cat or a dog

Cara is a **member** of the set of individuals that are **cats** *or* a **member** of the set of individuals that are **dogs**.

- **Set union**: The set that results from collecting all the individuals that belong to at least one of two sets.



Predicates

Venn diagrams

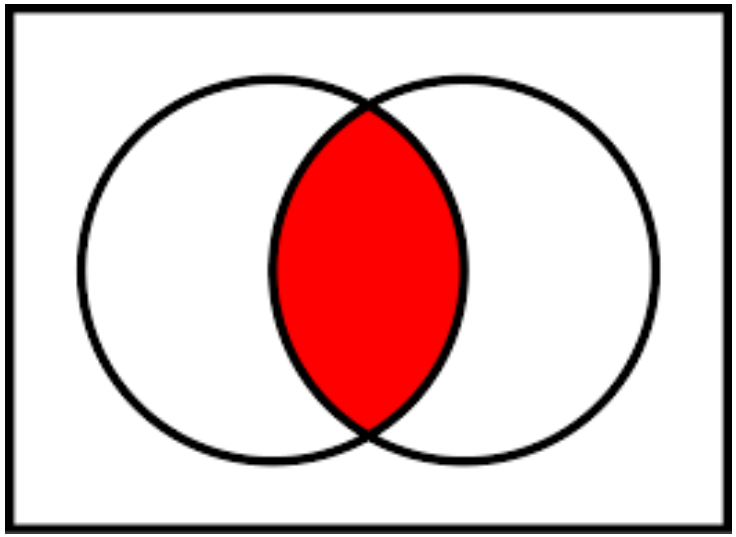
The **union** of the predicate *have wings* and the predicate *be extinct* includes, among other things, dodos, flamingos, and golden toads:

Natural language connectives

Venn diagrams

This is a useful way to describe natural language **connectives**.
Connectives relate entities to predicates in different ways:

and: Both predicates hold of a certain entity.
John is tall and handsome $\rightarrow$ John is a member of the set of tall entities and also a member of the set of handsome entities

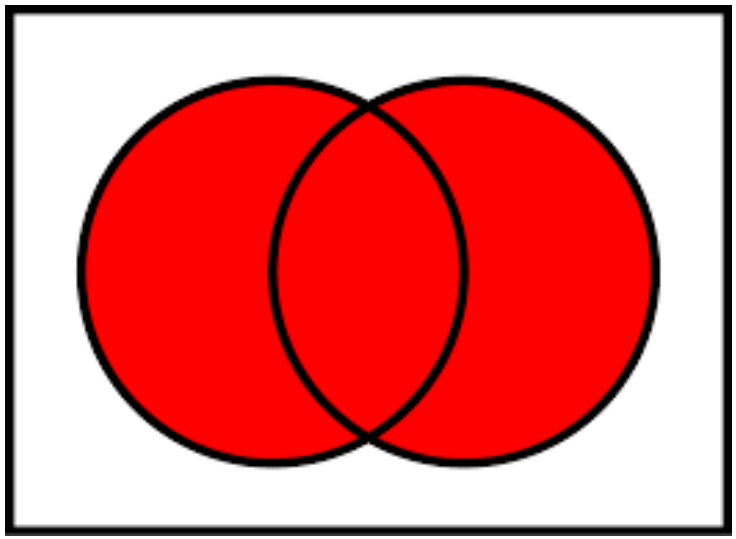


Natural language connectives

Venn diagrams

This is a useful way to describe natural language **connectives**.
Connectives relate entities to predicates in different ways:

(inclusive) or: At least one predicate holds of a certain entity.
Mary has a dog or (has) a cat. $\rightarrow$ Mary is a member of the set of dog owners or a member of the set of cat owners (or both).

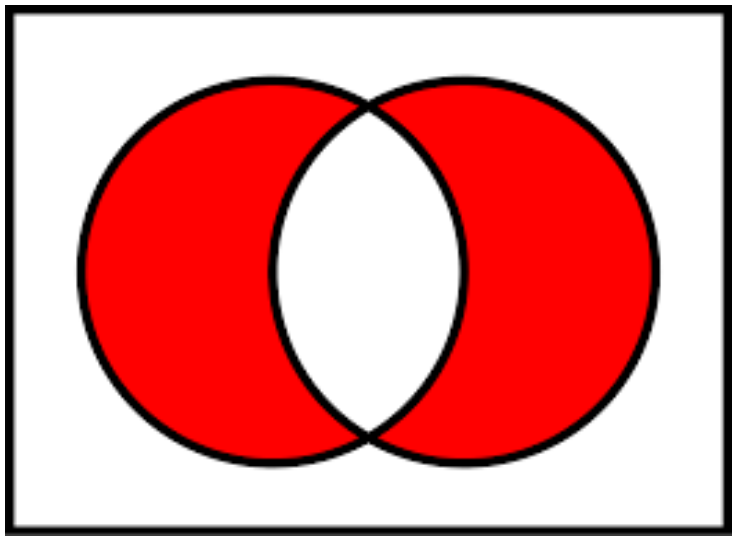


Natural language connectives

Venn diagrams

This is a useful way to describe natural language **connectives**.
Connectives relate entities to predicates in different ways:

(exclusive) or: One predicate or the other (but not both) hold of an entity.
Mary either has a dog or (has) a cat. → Mary is a member of the set of dog owners or a member of the set of cat owners (but not both).

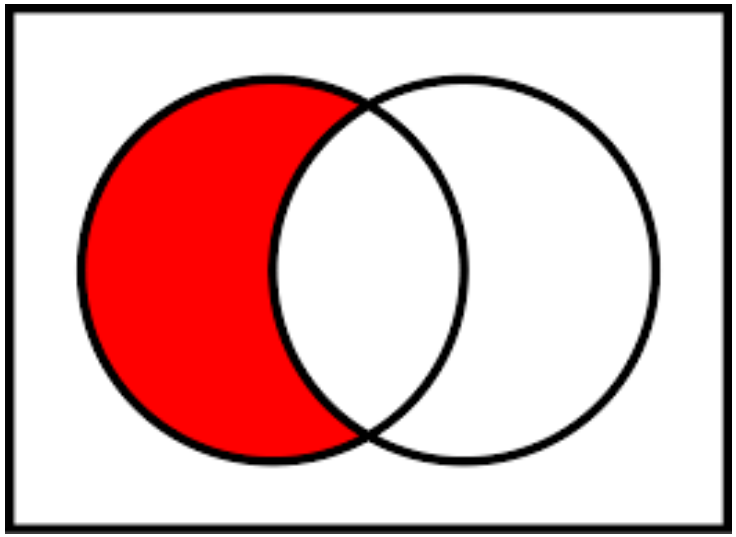


Natural language connectives

Venn diagrams

This is a useful way to describe natural language **connectives**.
Connectives relate entities to predicates in different ways:

not: A predicate does not hold of an entity.
Cara can run but not fly. $\rightarrow$ Cara is a member of the set of runners, but not a member of the set of fliers.

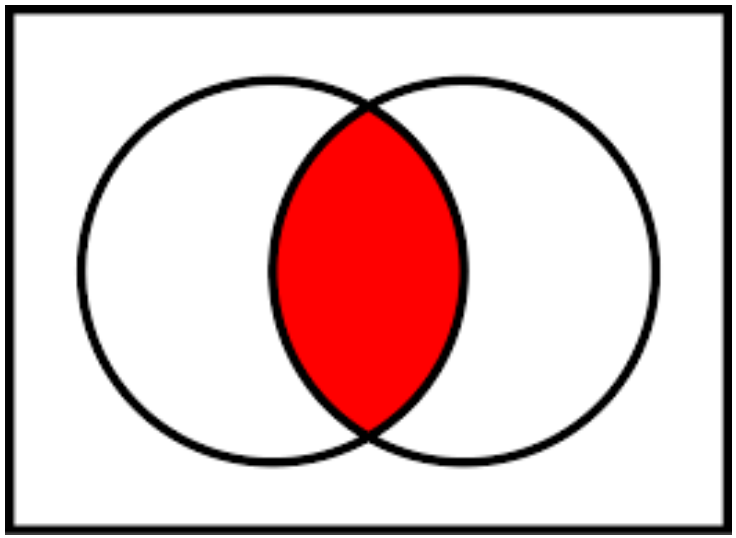


Practice: Natural language connectives

Venn diagrams

How would you diagram *but*?

Semantics is hard but fun.
but is logically equivalent to *and*, but it conveys an extra meaning of unexpectedness or contrast.



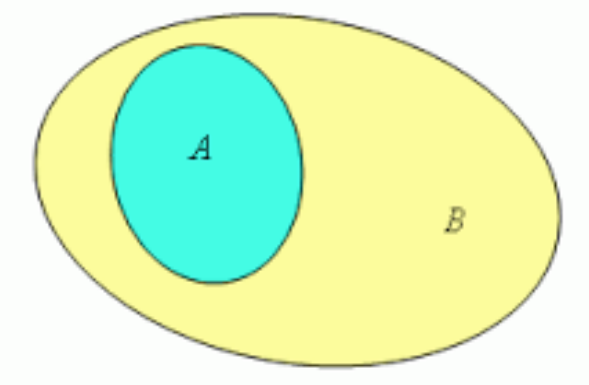
Natural language quantifiers

Venn diagrams

This is also a useful way to describe natural language **determiners**.
Quantifiers relate predicates to other predicates in different ways:

Every: the extension of one predicate is contained within the extension of another predicate.
(every member of set A is also a member of set B)

Every cat hunts mice.



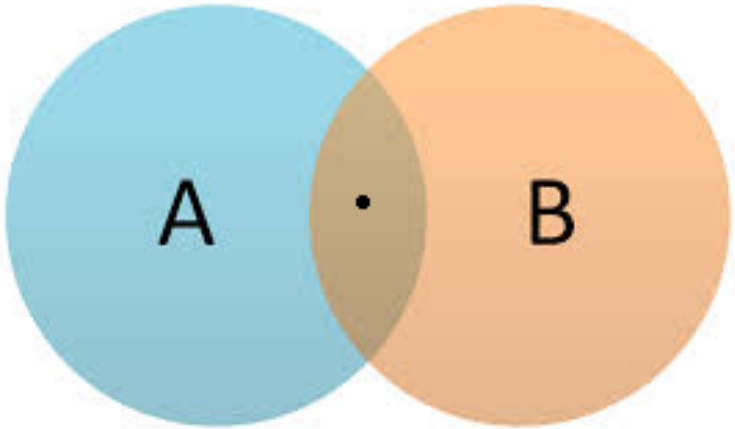
Natural language quantifiers

Venn diagrams

This is also a useful way to describe natural language **quantifiers**.
Quantifiers relate predicates to other predicates in different ways:

Some/a: two predicates have some shared members.
(the intersection of sets A and B is non-empty)

Some cats are afraid of dogs.



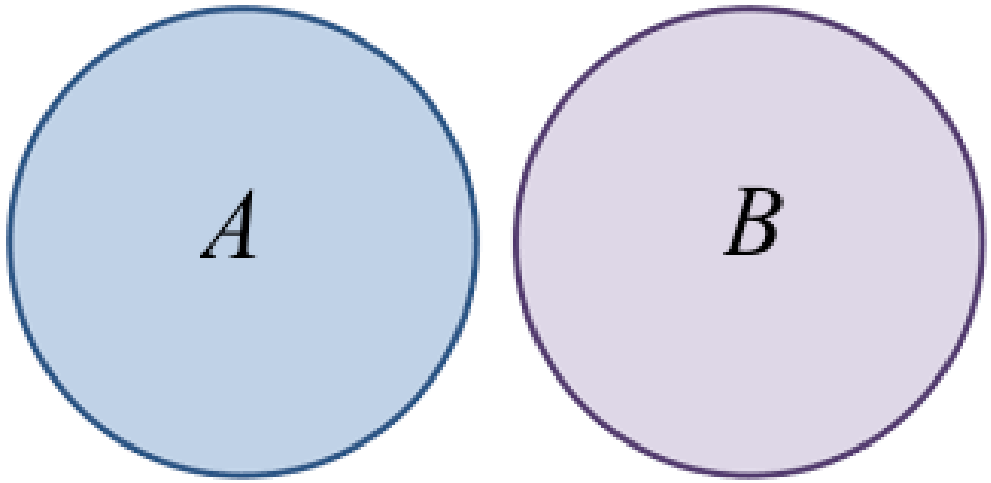
Natural language quantifiers

Venn diagrams

This is also a useful way to describe natural language **quantifiers**.
Quantifiers relate predicates to other predicates in different ways:

No: two predicates have no shared members.
(the intersection of sets A and B is empty)

No cats bark.



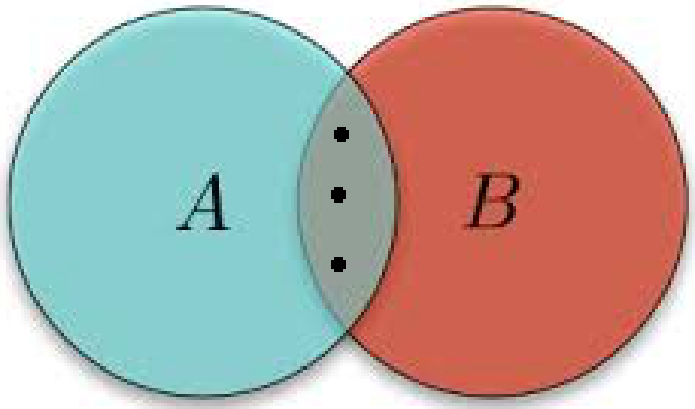
Natural language quantifiers

Venn diagrams

This is a also useful way to describe natural language **quantifiers**
Quantifiers relate predicates to other predicates in different ways:

Three: two predicates have *three* shared members
(by extension, other numerals would work the same).
(the intersection of sets A and B contains three members)

Three cats are meowing.



Natural language quantifiers

Summary

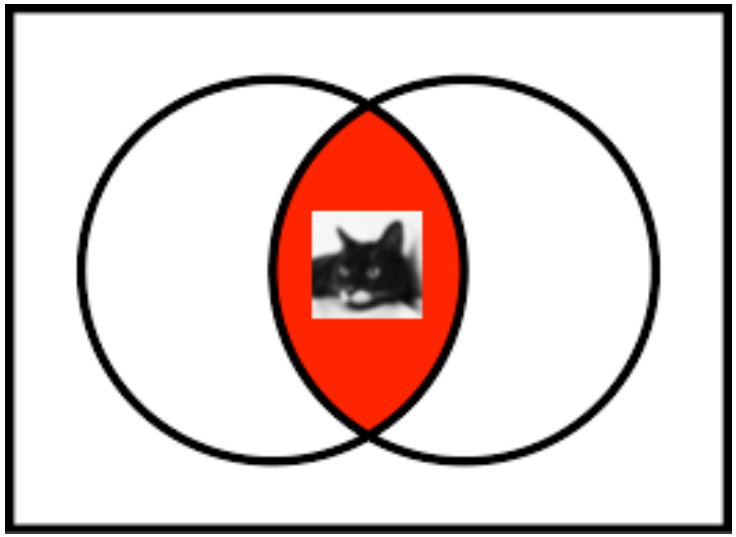
- Predicates can be described as **sets of individuals**.
- Natural language **connectives** relate individuals to sets.
  - **Intersection** of two sets: an individual is a member of both sets.
  - **Union** of two sets: an individual is a member of at least one of the sets.
  - *and, or, either.. or, not, but*
- Natural language **quantifiers** express relations between sets.
  - *every, some/a, no, n(umerals)*

Recall. . .

Modeling adjectives

- We can describe the role of the adjective ***black*** using set intersection:
- It restricts the set of cats to just the part that also satisfies being black.

Cara is a black cat



Modification

Modeling adjectives

Set intersection can describe other adjectives too:

- Gianni is an Italian singer.
- T-Rex is a carnivorous dinosaur.
- This is a round ball.
- "Harry Potter" is a fascinating book.

➽ These are called **intersective** adjectives.

Modification

Intersective adjectives

- Intersective adjectives conform to an **entailment** pattern.

(2) Cara is a black cat. entails...

a. Cara is black.

b. Cara is a cat.

(recall: A entails B if whenever A is true, B is also true.)

Modification

Does the entailment pattern hold for the adjective *former*?

(3) George is a former president.

(4) a. George is a president [not valid].

b. ?? George is former [not valid].

(recall: A entails B if whenever A is true, B is also true.)

Modification

Non-intersective adjectives

- Adjectives like *former* are **non-intersective**.

(5) George is a former president.

(6) This is a fake diamond.

(7) Benedict is an alleged Englishman.

In fact:

(8) George is a former president. entails...

a. George is not a president.

b. George was a president in the past.

Modification

Modeling adjectives

- Some adjectives depend on the context that they appear in.

(9) a. Ella is a tall 3-year-old.
b. Michael is a short basketball player.

(10) a. My 5-year-old nephew built a tall snowman.
b. The frat boys built a tall snowman.

- Adjectives like *tall* are **gradable**, or **relative-intersective**.
- Other gradable adjectives include: *large, clean, sharp, safe*.
- Gradable adjectives are **scalar**. They can be modified with adverbs: "extremely short", "kind of short", "pretty tall", "very tall", etc.

$$\textit{short} \longleftrightarrow \textit{tall}$$

Modification

Antonyms

- Adjectives often come in **antonym** pairs: tall–short, dirty–clear, . . .
- You can also be in-between: neither tall nor short.

- In contrast, **complementary** antonyms are not gradable: you are either completely A or completely B:
  - dead vs. alive
  - true vs. false
  - pass vs. fail
- Although we can still coerce modification and understand what the sentence would mean.
  - That's completely false.
  - He is barely alive.

Modification

Stacked adjectives

- We can use multiple adjectives to describe one noun.
- In some cases, this has no effect on meaning.

(11) a. A red silk shirt
b. A silk red shirt

- In other cases, there does seem to be a difference in meaning.
- Which shirt is which?

(12) a. A small large shirt
b. A large small shirt

➽ The adjective nearest the noun determines the context for the comparison. The outer adjective provides further modification.

Modification

Stacked adjectives

- Do we know if the person in (13a) is English? How about in (13b)?

(13) a. An alleged English baron — not English

b. An English alleged baron — English

- Is the person in each case a baron?

Modification

Stacked adjectives

- What kind of answers does (14a) refer to? How about (14b)?

(14) a. A common wrong answer
— an answer that is frequent among the wrong answers (but could be infrequent in general)

b. A wrong common answer
— an answer that is frequently given in general, and is also wrong

Modification

Stacked adjectives

- Adjectives can appear either before or after the noun. In that case, we might need to use brackets (or trees) to represent the structure.

(15) a. An [[expensive table] made of plastic]

b. An [expensive [table made of plastic]]

- Suppose that tables normally cost $200, and plastic tables cost $50.
- How much would the tables in (15a) and (15b) cost?

Modification

Summary

- **Intersective adjectives** can be described using set intersection. They conform to an entailment pattern:
  - *Cara is a black cat* entails: Cara is black and Cara is a cat.
- **Non-intersective adjectives** do not conform to the entailment pattern:
  - *This is a fake diamond* does not entail: this is a diamond.
- **Gradable adjectives** depend on the context that they are interpreted in.
  - *A tall 5-year-old* vs. *a tall basketball player*.
- **Antonym** pairs can be **gradable** or **complementary**.
  - *tall* vs. *short*.
  - *correct* vs. *incorrect*.

For next time...

- **Assignment 5** due today!
- **Read**: Parker & Riley , chapter 2 (pages 4-25), in course pack.