Semantics 2

today I have a cold…

ambiguity:

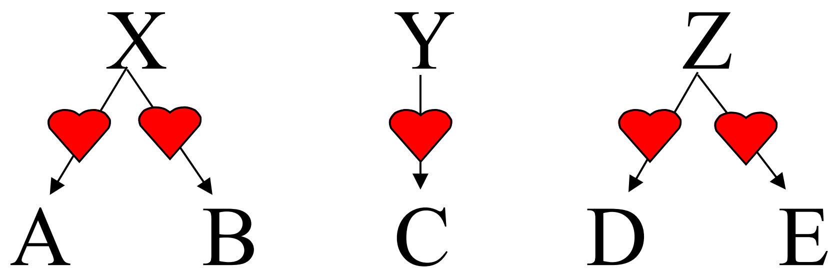
- **I once shot an elephant in my pajamas…**
- **Kicking baby considered to be healthy**
- **Flying planes can be dangerous**
- **Dr. Ruth talks about sex with newspaper editors**

Another kind of ambiguity

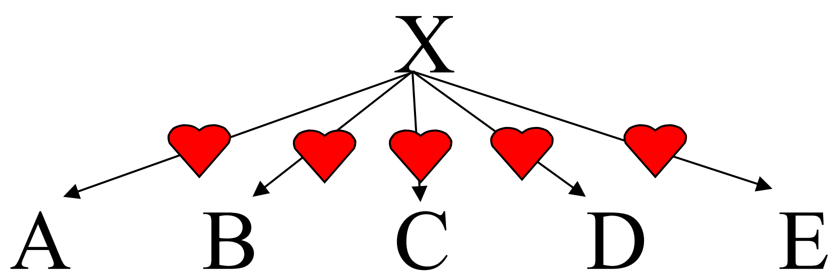
Someone loves everyone.

"Someone loves everyone":

For each person, there is someone who loves them.



There is a single person who loves everyone.



Everyone in this room speaks two languages.

Everyone in this room speaks two languages.

Two languages are spoken by everyone in this room.

Not obvious how to make this a structural ambiguity...

meanings of different kinds of NPs

Enrico Flor

meanings of different kinds of NPs

Enrico Flor [is an avid hangglider]

meanings of different kinds of NPs

The 24.900 TAs [are avid hanggliders]

meanings of different kinds of NPs

The 24.900 TAs [are avid hanggliders]

{ Enrico, Peter, Yash, Anton}

meanings of different kinds of NPs

Every Italian

??

meanings of different kinds of NPs

Every Italian="Enrico Flor, and
Stan Zompì, and
Roberta D'Alessandro, and
Guglielmo Cinque, and
Monica Bellucci,
and...."

meanings of different kinds of NPs

Every Italian
[is an avid hangglider]

“Enrico Flor, and
Stan Zompì, and
Roberta D'Alessandro, and
Guglielmo Cinque, and
Monica Bellucci,
and...." "...are avid hanggliders"

meanings of different kinds of NPs

"No Italian"=

meanings of different kinds of NPs

"No Italian"= ???!!@#$?

meanings of different kinds of NPs

"No Italian"=

- null set?

meanings of different kinds of NPs

"No Italian"=

- null set?
- a set containing no Italian?

(but which set?)

quantifiers are weird in other ways:

Paul is inside,
and Paul is outside.

<u>quantifiers are weird in other ways:</u>

Paul is inside,
and Paul is outside.

Several Americans are inside,
and several Americans are outside.

-->some QPs fail the **Law of Contradiction**

<u>quantifiers are weird in other ways:</u>

Takashi is under 6' tall,
or Takashi is over 5' tall.

quantifiers are weird in other ways:

Takashi is under 6' tall,
or Takashi is over 5' tall.

All Japanese men are under 6' tall,
or all Japanese men are over 5' tall.

-->some QPs fail the **Law of the Excluded Middle**

Quantifier Meaning

Okay, so

No Turks

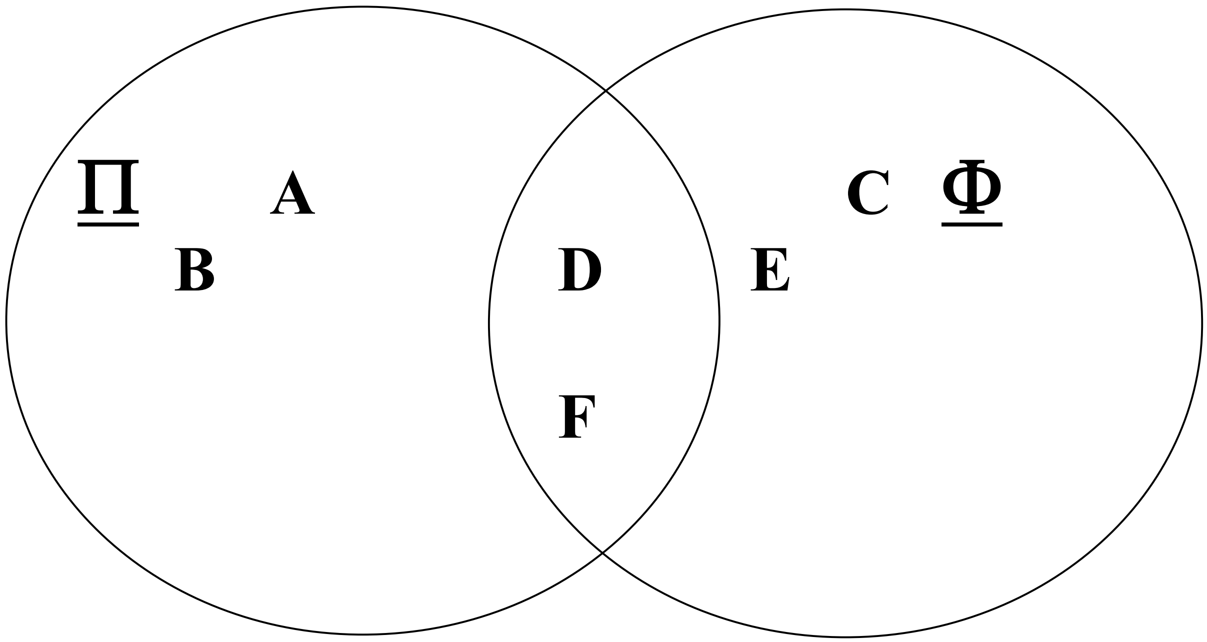
Several Americans

All Italians

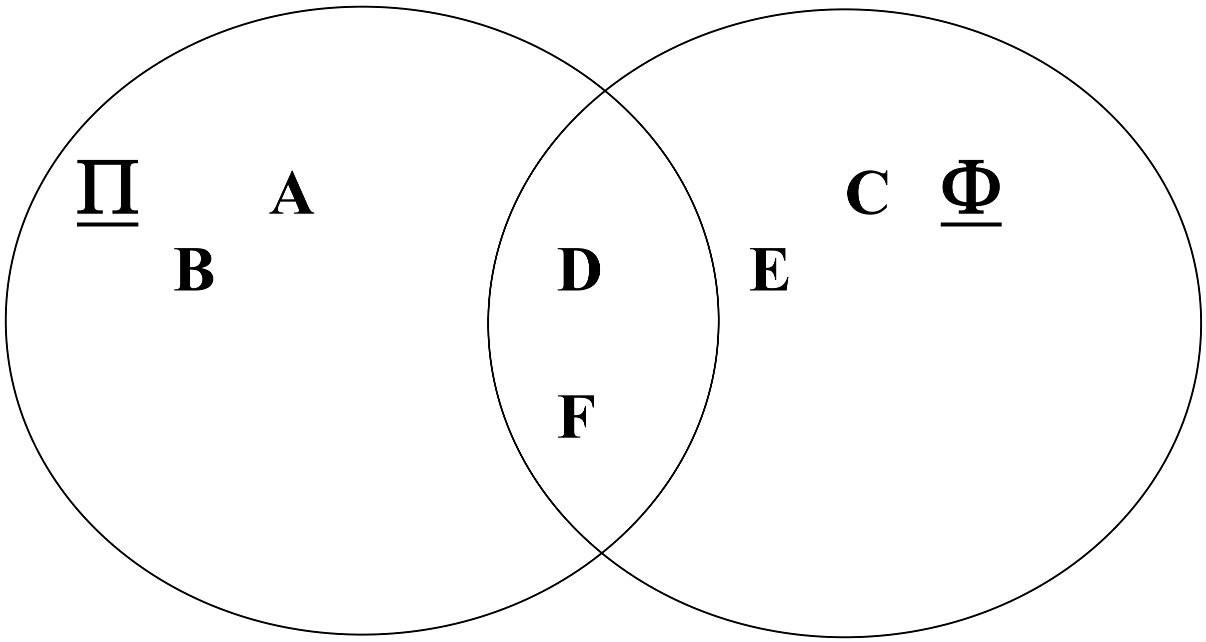
Most Ukrainians...

don't refer to sets of people. So what do they mean?

A little quick set theory

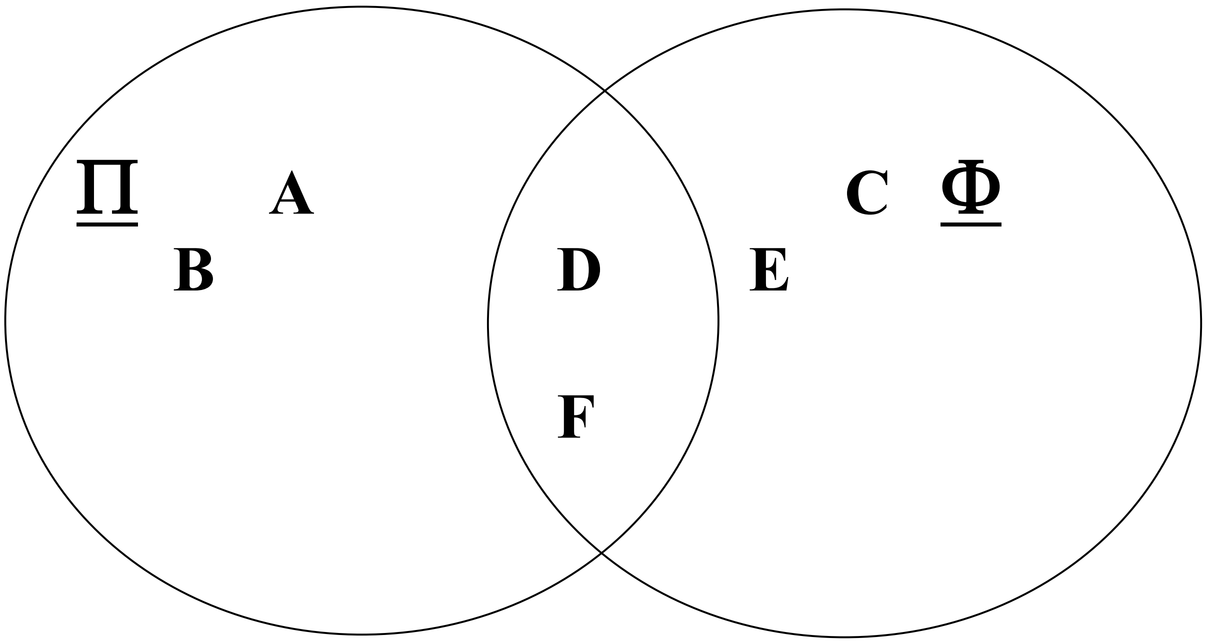


A little quick set theory



{D, F}=the **intersection** of Π and Φ (Π ∩ Φ)

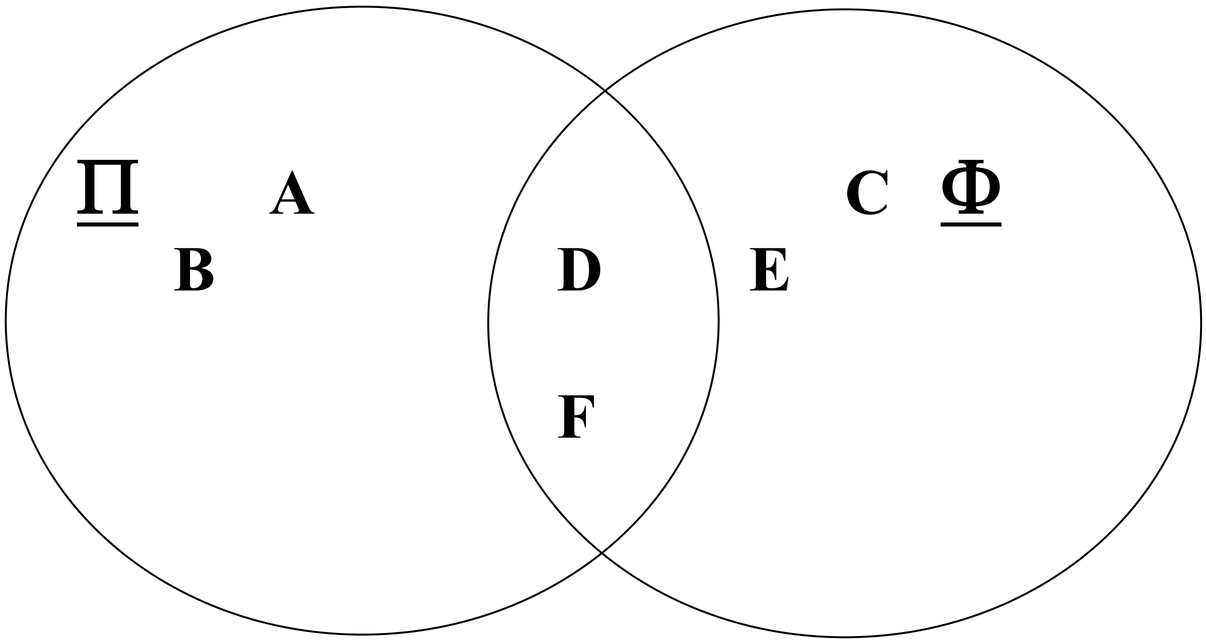
A little quick set theory



{D, F}=the **intersection** of Π and Φ $(\Pi \cap \Phi)$

{A, B, C, D, E, F}=the **union** of of Π and Φ $(\Pi \cup \Phi)$

A little quick set theory



{D, F}=the **intersection** of Π and Φ ($\Pi \cap \Phi$)

{A, B, C, D, E, F}=the **union** of of Π and Φ($\Pi \cup \Phi$)

{A, B, D} is a **subset** of Π ($\{A, B, D\} \subseteq \Pi$)

Quantifier Meaning

a popular answer:

All Americans eat junk food.

Quantifier Meaning

a popular answer:

All Americans eat junk food

denotes set of Americans

denotes set of junk-food-eaters

Quantifier Meaning

a popular answer:

All Americans eat junk food

denotes set of Americans

denotes set of junk-food-eaters

all:set #1 is a subset of set #2

Quantifier Meaning

Some Americans eat junk food

denotes set of Americans

denotes set of junk-food-eaters

Quantifier Meaning

Some Americans eat junk food

denotes set of Americans

denotes set of junk-food-eaters

some : the intersection of set #1 and set #2 is nonempty

Quantifier Meaning

No Americans eat nattoo

denotes set of Americans

denotes set of nattoo-eaters

no: the intersection of set #1 and set #2 is empty

Quantifier Meaning

all:set #1 is a subset of set #2

some : the intersection of set #1 and set #2 is nonempty

no: the intersection of set #1 and set #2 is empty

three: the intersection of set #1 and set #2 has cardinality three.

Quantifier Meaning

Natural language quantifiers are **conservative**, which means that you can always replace "set #2" with "the intersection of set #1 and set #2", and get the same meaning.

Quantifier Meaning: conservativity

All opera singers smoke

$\{\text{opera singers}\} \subseteq \{\text{smokers}\}$

Quantifier Meaning: conservativity

All opera singers smoke

{opera singers} $\subseteq$ {smokers}

All opera singers are
opera singers who smoke

{opera singers} $\subseteq$ { {smokers}$\cap${opera singers} }

Quantifier Meaning: conservativity

This isn't trivial. It's easy to imagine quantifiers which wouldn't be conservative:

glorp: the union of set #1 and set #2 has cardinality three.

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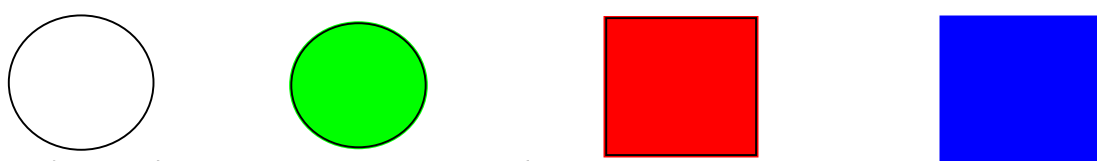
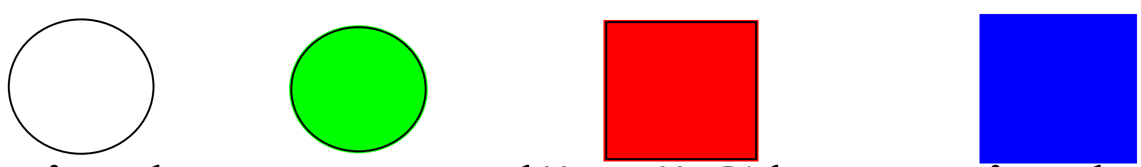


"Glorp circles are red"

Quantifier Meaning: conservativity

This isn't trivial. It's easy to imagine quantifiers which wouldn't be conservative:

glorp: the union of set #1 and set #2 has cardinality three.



"Glorp circles are red" ≠ "Glorp circles are red circles"

Quantifier Meaning

All [Brazilians] [love soccer]=

Quantifier Meaning

All [Brazilians] [love soccer]=

{Brazilians} is a subset of {people who love soccer}

Quantifier Meaning

All [Brazilians] [love soccer]=

{Brazilians} is a subset of
{people who love soccer}
(={x such that x loves soccer})

(replace the quantifier with a variable)

Quantifier Meaning

Soccer bores [all [Americans]]

Quantifier Meaning

Soccer bores [all [Americans]]

{Americans} is a subset of
{people whom soccer bores}

Quantifier Meaning

Soccer bores [all [Americans]]

{Americans} is a subset of
{people whom soccer bores}
(={x such that soccer bores x})

again, quantifier replaced w/variable

Quantifier Scope Ambiguity

[Some child] loves [every puppy]

Quantifier Scope Ambiguity

[Some child] loves [every puppy]

- interpreting *every* first:

{puppies} is a subset of

{x such that some child loves x}

<u>Quantifier Scope Ambiguity</u>

[Some child] loves [every puppy]

- interpreting *every* first:

{puppies} is a subset of
{x such that **some child loves <u>x</u>**}

now how do we interpret this part?

Quantifier Scope Ambiguity

[Some child] loves [every puppy]

- interpreting *every* first:

{puppies} is a subset of

{x such that:

the intersection of {children} with

{y such that y loves x} is nonempty}

Quantifier Scope Ambiguity

[Some child] loves [every puppy]

- translating this from Semantics into English:

every member x of {puppies} is such that:

the intersection of {children} with {y such that y loves x} is nonempty

Quantifier Scope Ambiguity

[Some child] loves [every puppy]

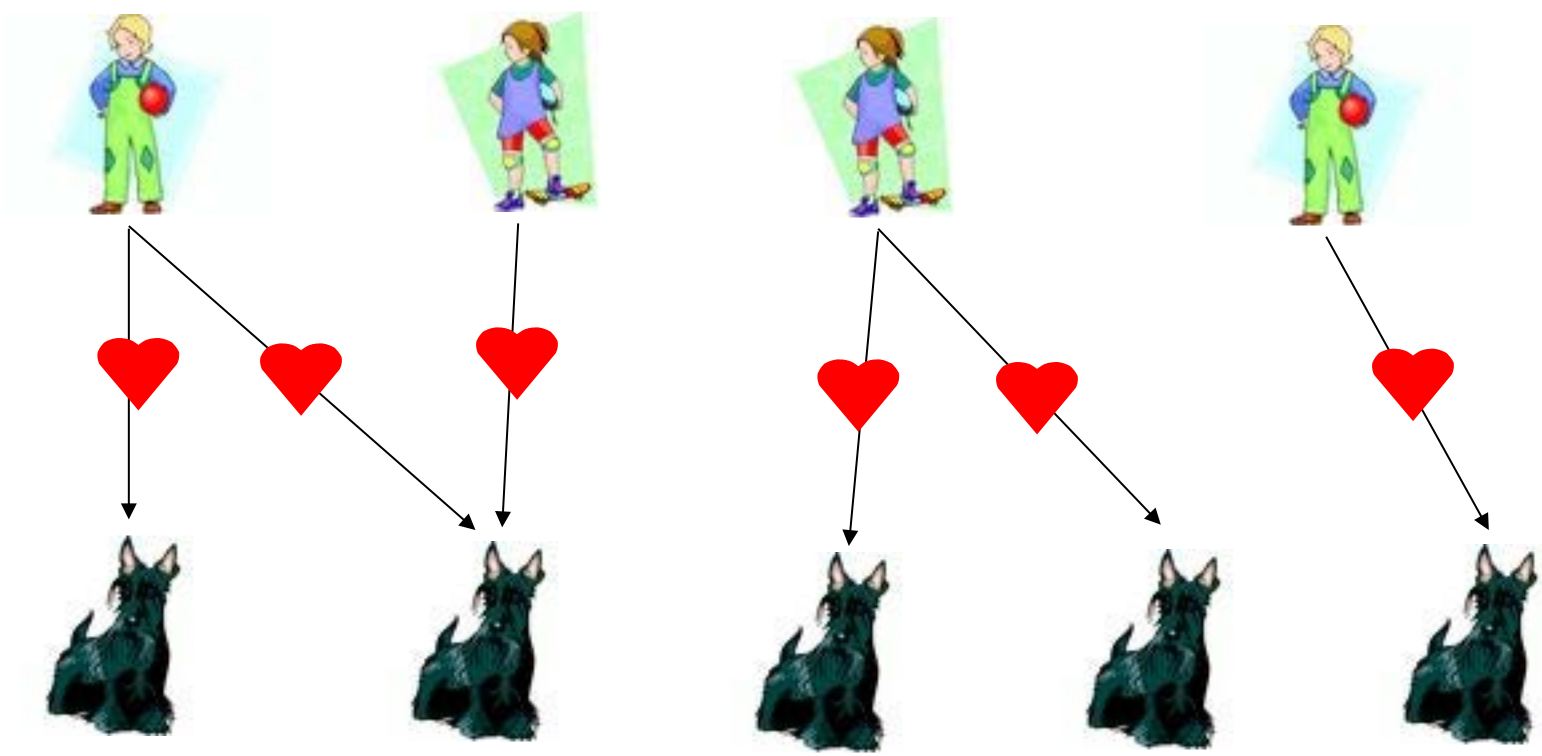
- translating this from Semantics into English:

every member of {puppies} is such that:
there is some child that loves it.

Quantifier Scope Ambiguity

[Some child] loves [every puppy]

every member of {puppies} is such that:
there is some child that loves it.



<u>Quantifier Scope Ambiguity</u>

[Some child] loves [every puppy]

We just saw how this gets interpreted if we interpret *every puppy* first. How about if we interpret *some child* first?

Quantifier Scope Ambiguity

[Some child] loves [every puppy]

The intersection of {children} and {x such that x loves every puppy} is nonempty.

Quantifier Scope Ambiguity

[Some child] loves [every puppy]

The intersection of {children} and {x such that **x loves every puppy**} is nonempty.

next we interpret this...

Quantifier Scope Ambiguity

[Some child] loves [every puppy]

The intersection of {children} and
{x such that:
{puppies} is a subset of {y such that x loves y}}
is nonempty.

Quantifier Scope Ambiguity

[Some child] loves [every puppy]

The intersection of {children} and
{x such that:
{puppies} is a subset of
{y such that x loves y}}
is nonempty. **(...now to translate this back into English.....)**

Quantifier Scope Ambiguity

[Some child] loves [every puppy]

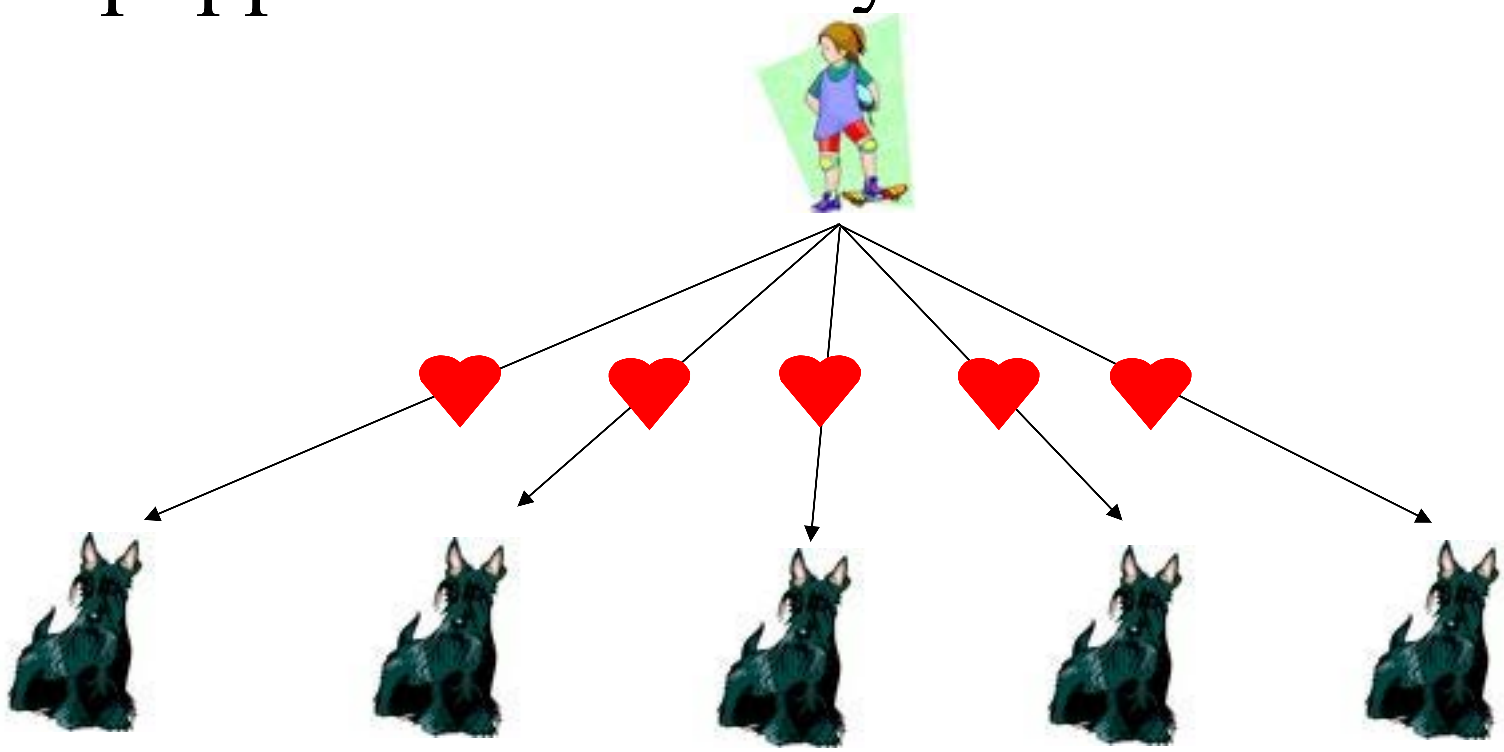
There is at least one child, x, such that:

{puppies} is a subset of {things such that x loves them}}

Quantifier Scope Ambiguity

[Some child] loves [every puppy]

There is at least one child such that:
all puppies are loved by them.



Quantifier Scope Ambiguity

[Some child] loves [every puppy]

There is at least one child such that:
all puppies are loved by them.

every puppy is such that:
there is some child that loves it.

Quantifier Scope Ambiguity

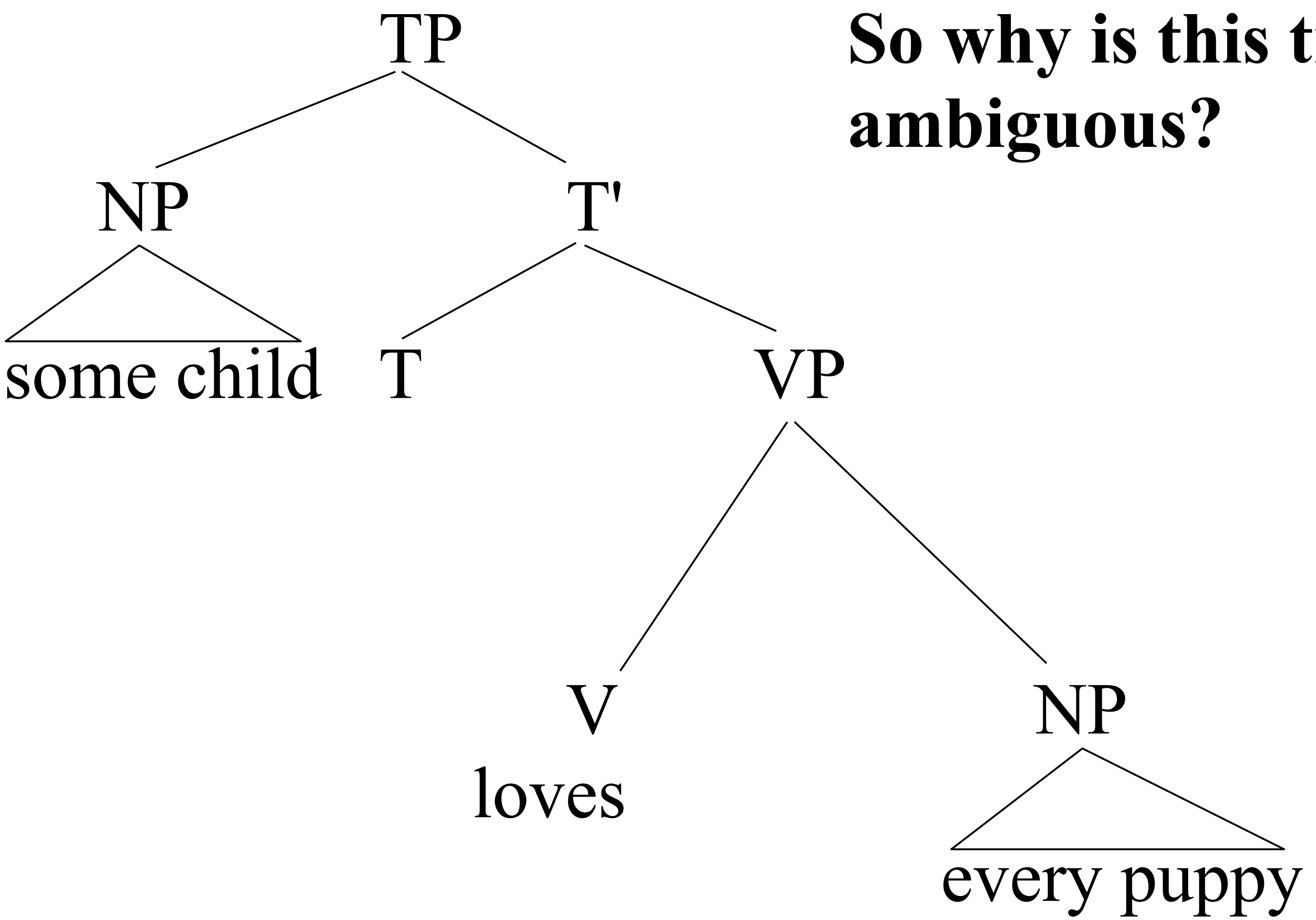
[Some child] loves [every puppy]

There is at least one child such that:
all puppies are loved by them.

every puppy is such that:
there is some child that loves it.

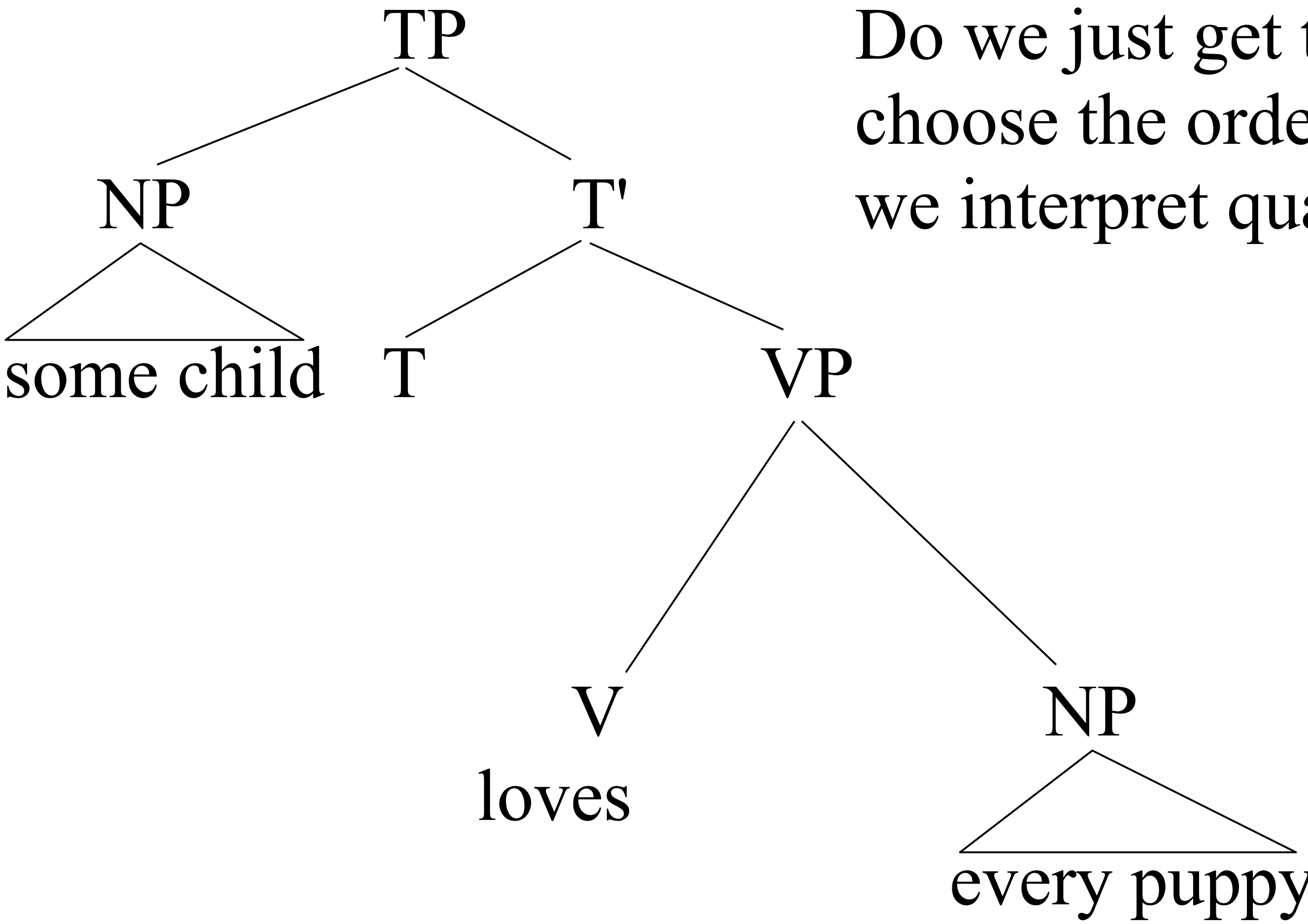
-->just saw how to get this ambiguity to follow from different orders of quantifier interpretation.

Quantifier Scope Ambiguity



So why is this tree ambiguous?

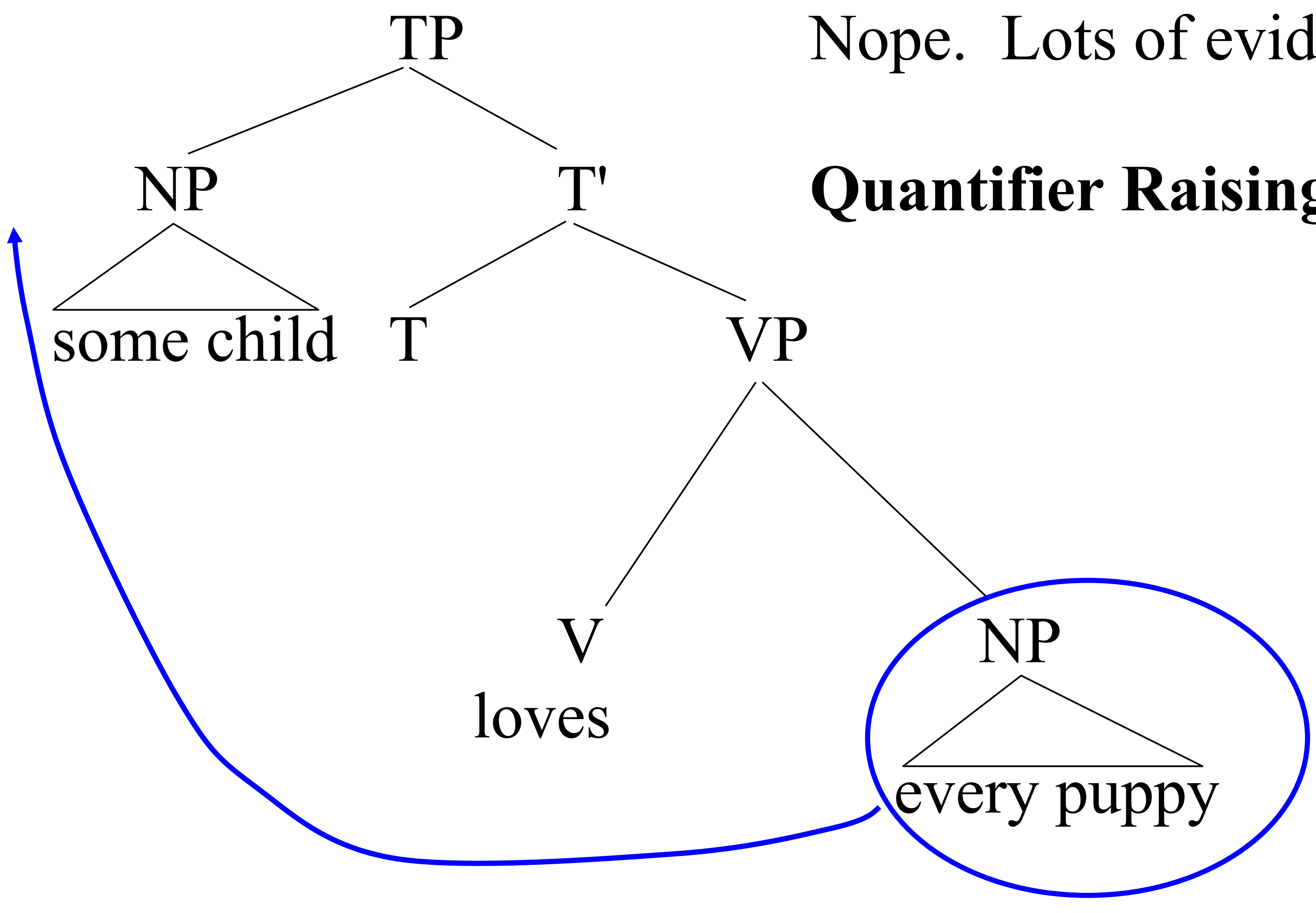
Quantifier Scope Ambiguity



Do we just get to freely choose the order in which we interpret quantifiers?

Semantics 2

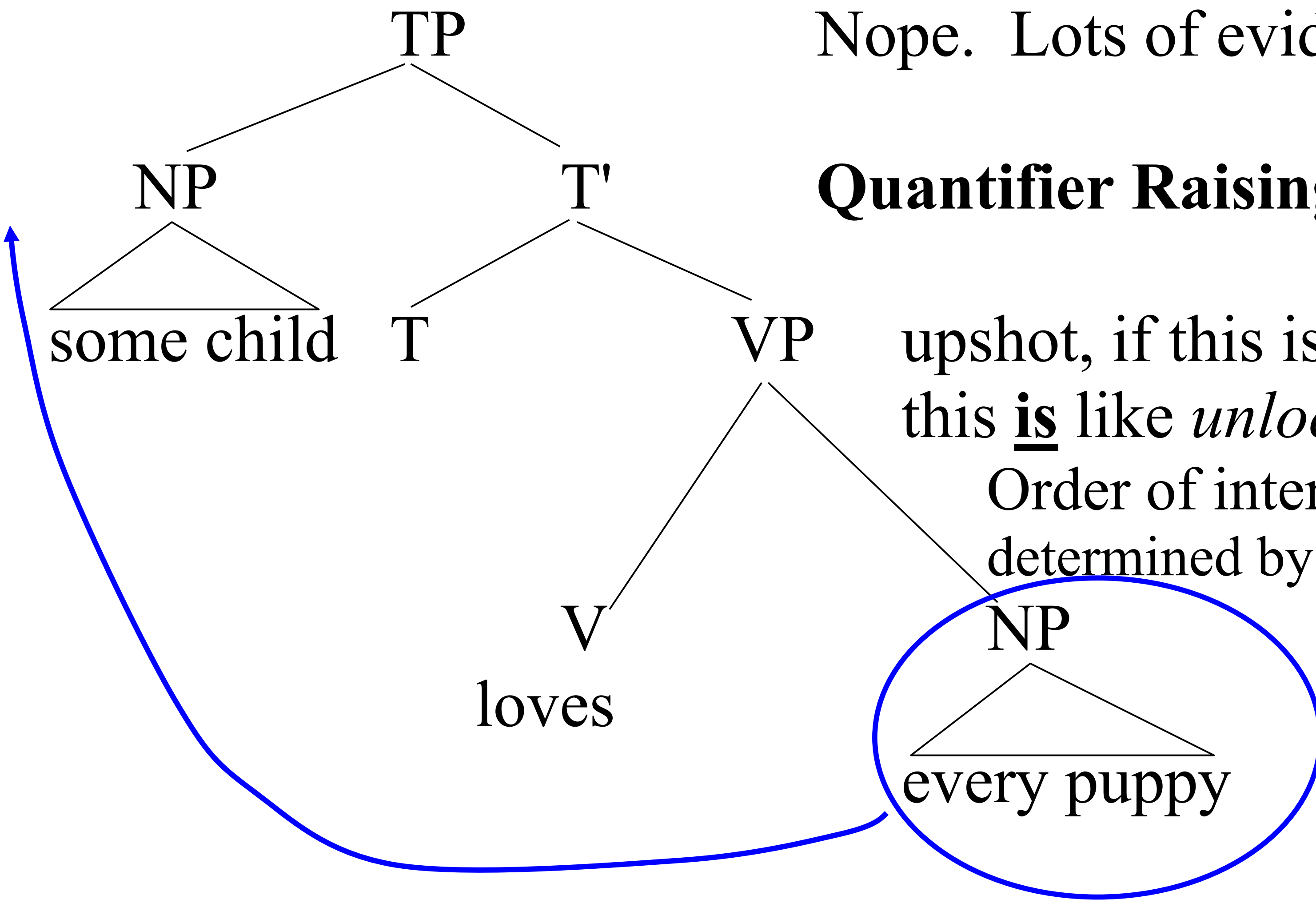
Quantifier Scope Ambiguity



Nope. Lots of evidence:

Quantifier Raising

Quantifier Scope Ambiguity



Nope. Lots of evidence:

Quantifier Raising

upshot, if this is right:
this **is** like *unlockable*.

Order of interpretation
determined by structure.

Quantifier Raising

Most people ate two cakes.

Quantifier Raising

Hungarian:

Tegnap a legtöbb ember két süteményből evett
Yesterday most people from two cakes ate
'Yesterday, most people ate from two cakes'
(that is, for most of the individuals x, it's true that x ate from two cakes)

Quantifier Raising

Hungarian:

Tegnap a legtöbb ember két süteményből evett
Yesterday most people from two cakes ate
'Yesterday, most people ate from two cakes'

Tegnap két süteményből a legtöbb ember evett
Yesterday from two cakes most people ate
'Yesterday, there were two cakes that most people ate from'

(remember wh-in-situ?)

More on Quantifier Raising (QR)

Someone loves everyone.

More on Quantifier Raising (QR)

Someone loves everyone.

- $\forall x\ \exists y$ [y loves x]
- $\exists y\ \forall x$ [y loves x]

More on Quantifier Raising (QR)

Someone loves everyone.

- $\forall x\ \exists y$ [y loves x]
- $\exists y\ \forall x$ [y loves x]

how do we capture this ambiguity?

More on Quantifier Raising (QR)

Someone loves everyone.

- $\forall x\ \exists y$ [y loves x]
- $\exists y\ \forall x$ [y loves x]

how do we capture this ambiguity?

→ **structurally**: quantifiers move

More on QR

A guard is standing in front of every building.

More on QR

A guard is standing in front of every building.

More on QR

A guard is standing in front of every building.

More on QR

A guard said that I should stand in front of every building.

same ambiguity?

More on QR

A guard said that I should stand in front of every building.

same ambiguity? No:
→ QR is *clause-bound*.

More on QR

A guard seems to be standing
in front of every building.

...ambiguous?

More on QR

A guard seems to be standing
in front of every building.

...ambiguous? why?

More on QR

A guard seems to be standing
in front of every building.

...ambiguous? why?
I seem to a guard to be standing
in front of every building.

More on QR

A guard seems to be standing
in front of every building.
I seem to a guard to be standing
in front of every building.
→ when is ambiguity possible?

More on QR

A guard seems (a guard) to be standing in front of every building.

→ when is ambiguity possible?