Semantics

Image removed for copyright reasons.

ambiguity:

- **British left waffles on Falklands**

ambiguity:

- **British left waffles on Falklands**
- **Kicking baby considered to be healthy**

ambiguity:

- **British left waffles on Falklands**
- **Kicking baby considered to be healthy**
- **Sisters reunited after 18 years in checkout line at supermarket**

ambiguity:

- **British left waffles on Falklands**
- **Kicking baby considered to be healthy**
- **Sisters reunited after 18 years in checkout line at supermarket**
- **Dr. Ruth talks about sex with newspaper editors**

talk [$_{PP}$ about sex] [$_{PP}$ with newspaper editors]

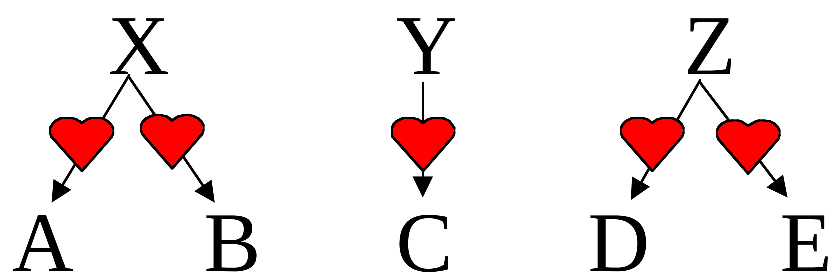
talk [$_{PP}$ about [$_{NP}$ sex with newspaper editors]]

Another kind of ambiguity

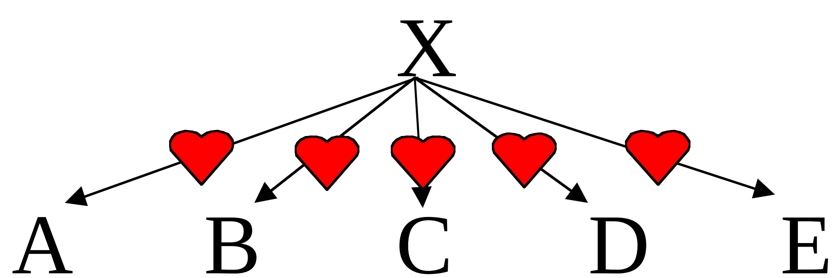
Someone loves everyone.

"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

Mary Ann Walter

meanings of different kinds of NPs

Mary Ann Walter   [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]

{Mary Ann, Andrés, Justin, Pranav, Aly}

meanings of different kinds of NPs

Every Texan

??

meanings of different kinds of NPs

Every Texan="Mary Ann Walter, and
George Bush, and
Molly Ivins, and
Lyndon Johnson, and
Ross Perot, and
Dan Rather, and...."

meanings of different kinds of NPs

Every Texan [is an avid hangglider]

"Mary Ann Walter, and
George Bush, and
Molly Ivins, and
Lyndon Johnson, and
Ross Perot, and
Dan Rather, and...." "...are avid hanggliders"

meanings of different kinds of NPs

"No Texan"=

meanings of different kinds of NPs

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

meanings of different kinds of NPs

"No Texan"=

- null set?

meanings of different kinds of NPs

"No Texan"=

- null set?
- a set containing no Texans?

(but which set?)

quantifiers are weird in other ways:

Andrés is inside,
  and Andrés is outside.

quantifiers are weird in other ways:

Andrés is inside,
  and Andrés is outside.

Several Argentinians are inside,
and several Argentinians are outside.

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

quantifiers are weird in other ways:

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

quantifiers are weird in other ways:

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

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

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

Quantifier Meaning

Okay, so

No Texans
Several Argentinians
All Californians
Most Americans...

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

A little quick set theory

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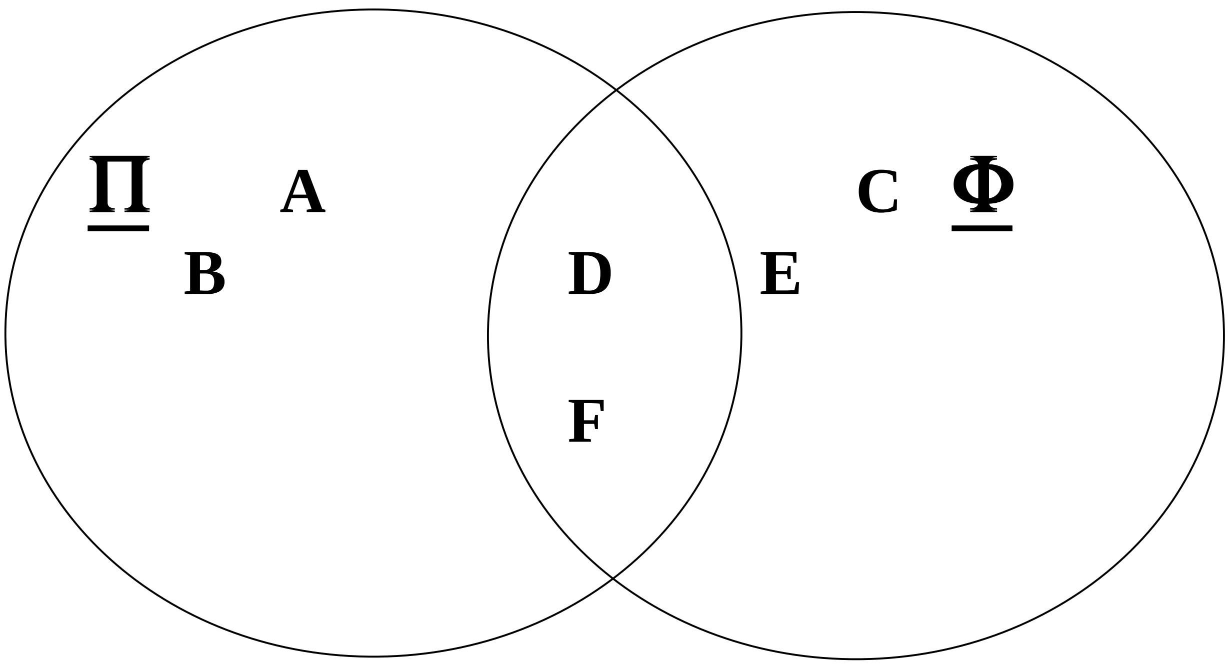
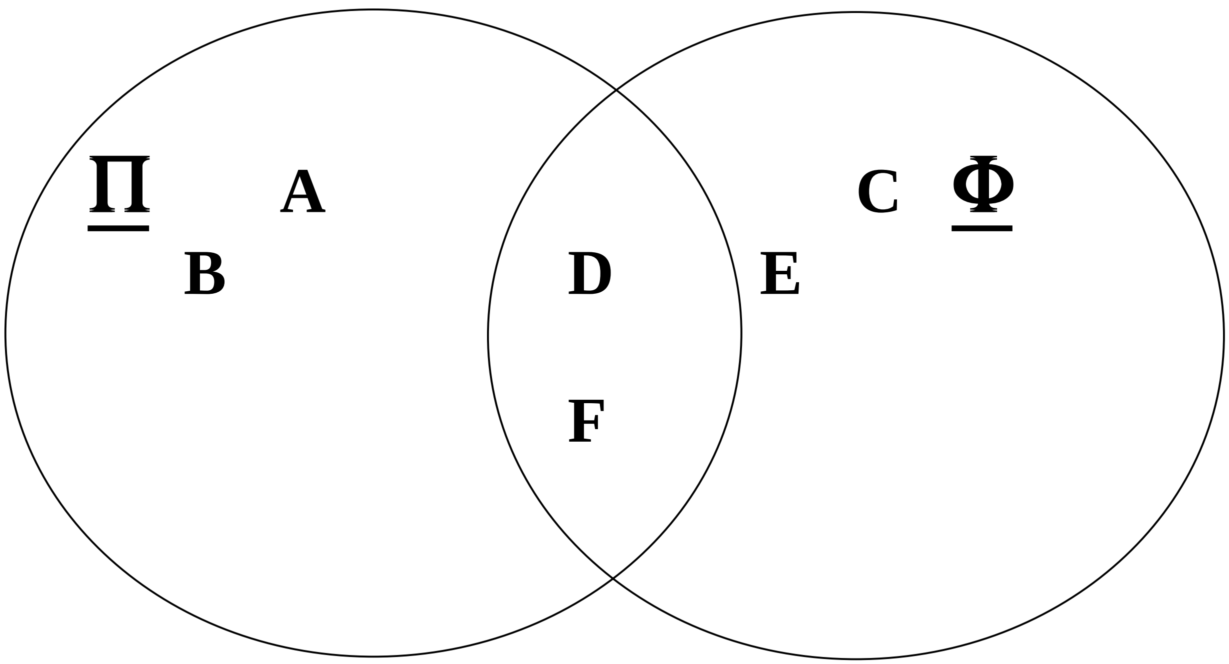
A little quick set theory

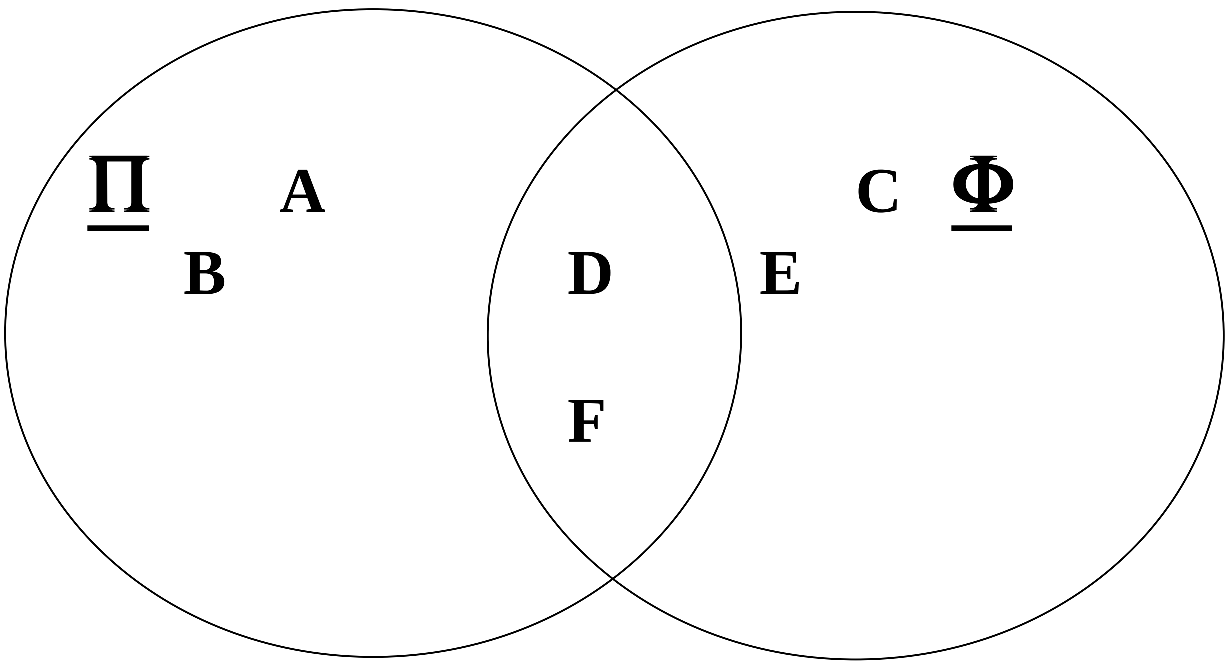


<u>A little quick set theory</u>



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

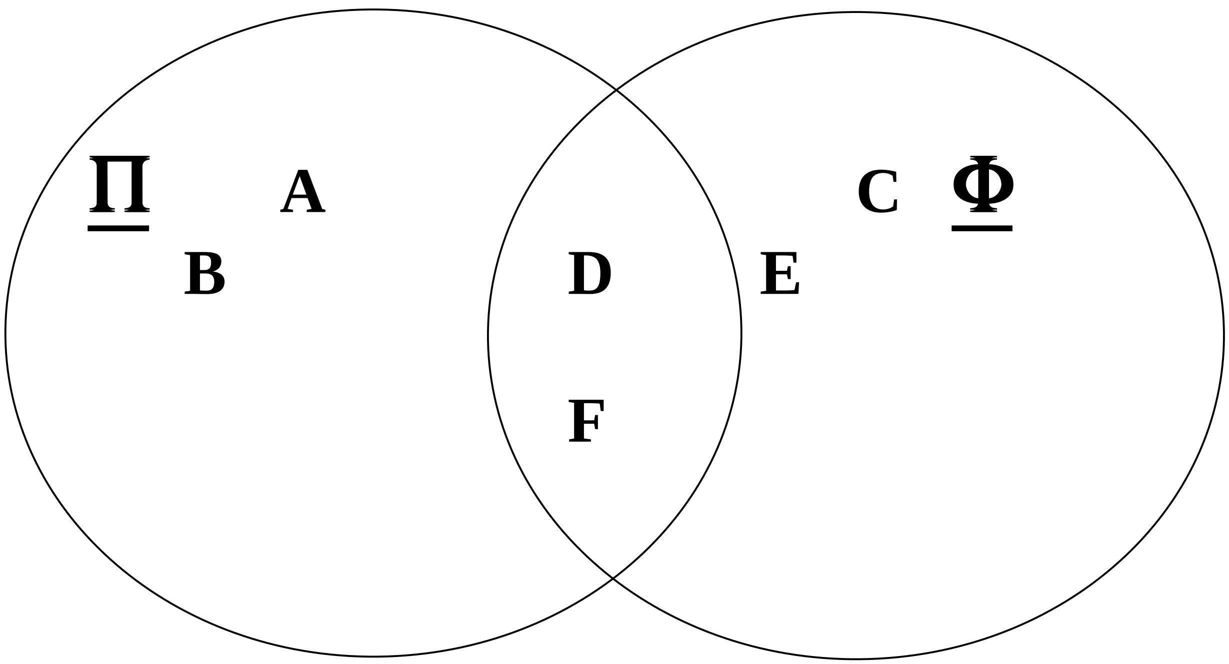
A little quick set theory



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

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

<u>A little quick set theory</u>



{D, F}=the **<u>intersection</u>** of **<u>Π</u>** and **<u>Φ</u>** ($\Pi \cap \Phi$)
{A, B, C, D, E, F}=the **<u>union</u>** of of **<u>Π</u>** and **<u>Φ</u>** ($\Pi \cup \Phi$)
{A, B, D} is a **<u>subset</u>** of **<u>Π</u>** ({A, B, D}$\subseteq$ **<u>Π</u>**)

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

<u>Quantifier Meaning</u>

Some Americans eat junk food

denotes set of Americans

denotes set of junk-food-eaters

<u>some</u> : 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

{opera singers} $\subseteq$ {smokers}

Quantifier Meaning: conservativity

All opera singers smoke

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

All opera singers are
opera singers who smoke

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

<u>**Quantifier Meaning: conservativity**</u>

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.

Quantifier Meaning: conservativity

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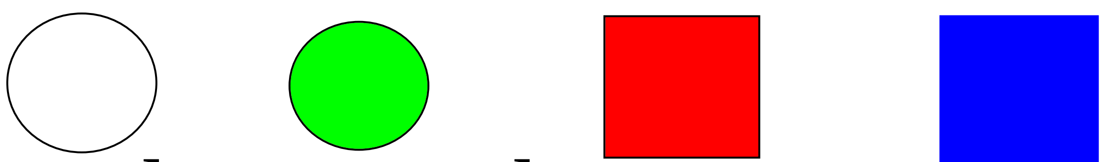
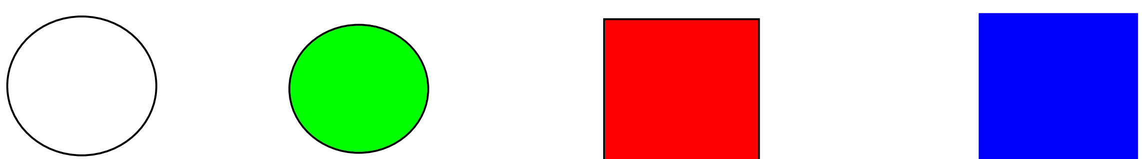


"Glorp circles are red"

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 [Filipinos] [love balut]=

Quantifier Meaning

All [Filipinos] [love balut]=

{Filipinos} is a subset of {people who love balut}

Quantifier Meaning

All [Filipinos] [love balut]=

{Filipinos} is a subset of
{people who love balut}
(={people such that they love balut})

(replace the quantifier with a pronoun)

Quantifier Meaning

Balut disgusts [all [Americans]]

Quantifier Meaning

Balut disgusts [all [Americans]]

{Americans} is a subset of
{people whom balut disgusts}

Quantifier Meaning

Balut disgusts [all [Americans]]

{Americans} is a subset of
{people whom balut disgusts}
(={people such that balut disgusts them})

again, quantifier replaced w/pronoun

Quantifier Scope Ambiguity

[Some child] loves [every puppy]

Quantifier Scope Ambiguity

[Some child] loves [every puppy]

- interpreting *every* first:

{puppies} is a subset of

{things such that some child loves them}

Quantifier Scope Ambiguity

[Some child] loves [every puppy]

- interpreting *every* first:

{puppies} is a subset of

{things such that **some child loves them**}

now how do we interpret this part?

Quantifier Scope Ambiguity

[Some child] loves [every puppy]

- interpreting *every* first:

{puppies} is a subset of

{things such that:

the intersection of {children} with {people such that they love them} is nonempty}

Quantifier Scope Ambiguity

[Some child] loves [every puppy]

- translating this from Semantics into English:

every member of {puppies} is such that:

the intersection of {children} with {people such that they love them} 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.

Images of child and dog removed for copyright reasons.

Quantifier Scope Ambiguity

[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 {people such that they love every puppy} is nonempty.

Quantifier Scope Ambiguity

[Some child] loves [every puppy]

The intersection of {children} and {people such that **they love every puppy**} is nonempty.

next we interpret this...

Quantifier Scope Ambiguity

[Some child] loves [every puppy]

The intersection of {children} and
{people such that:
{puppies} is a subset of {things such that they love them}}
is nonempty.

Quantifier Scope Ambiguity

[Some child] loves [every puppy]

The intersection of {children} and
{people such that:
{puppies} is a subset of {things such that they love them}}
is nonempty. **(...now to translate this back into English.....)**

<u>Quantifier Scope Ambiguity</u>

[Some child] loves [every puppy]

There is at least one child such that:

{puppies} is a subset of {things such that they love <u>them</u>}}

Quantifier Scope Ambiguity

[Some child] loves [every puppy]

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

Images of child and dog removed for copyright reasons.

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

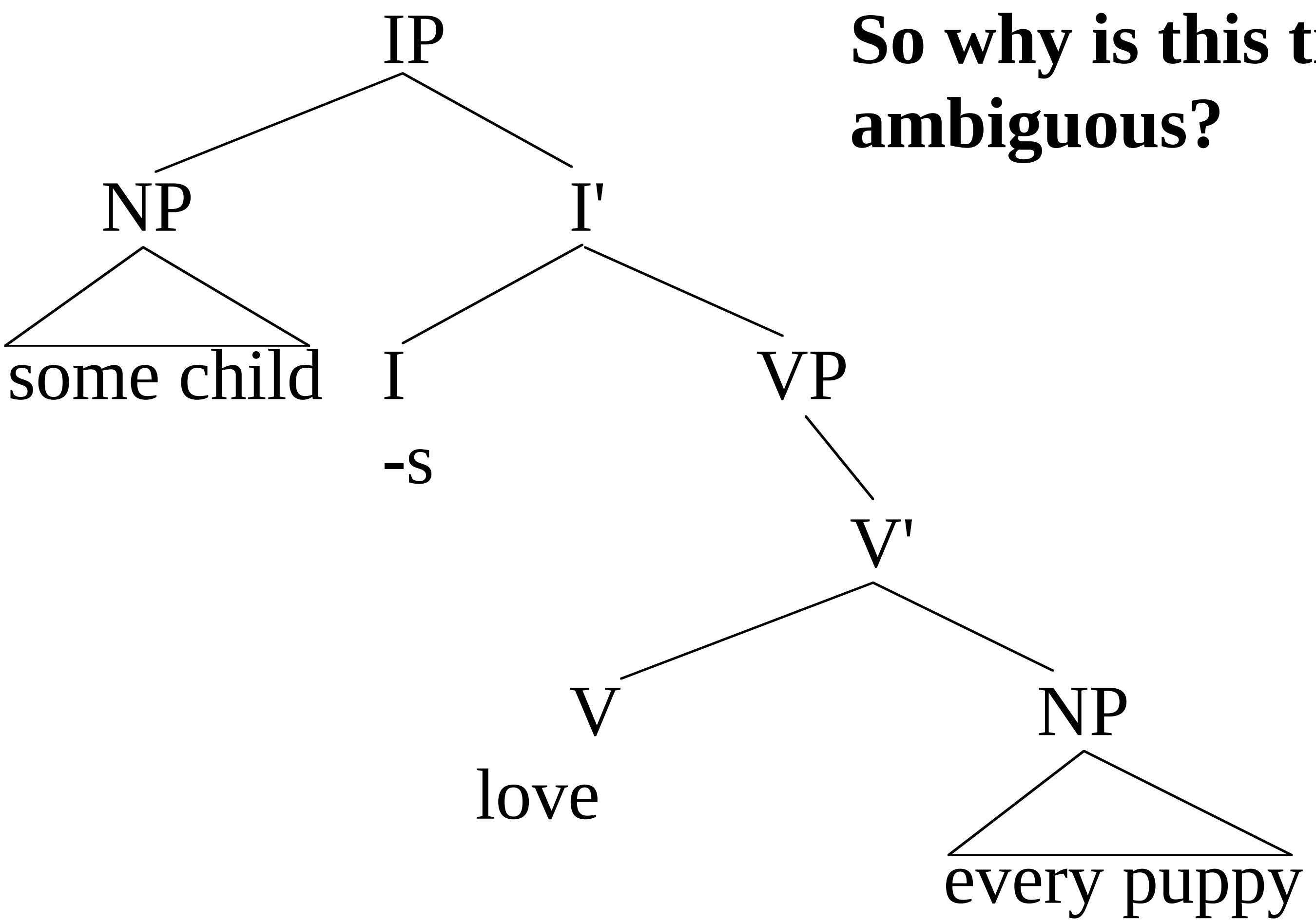
[Some child] loves [every puppy]

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.

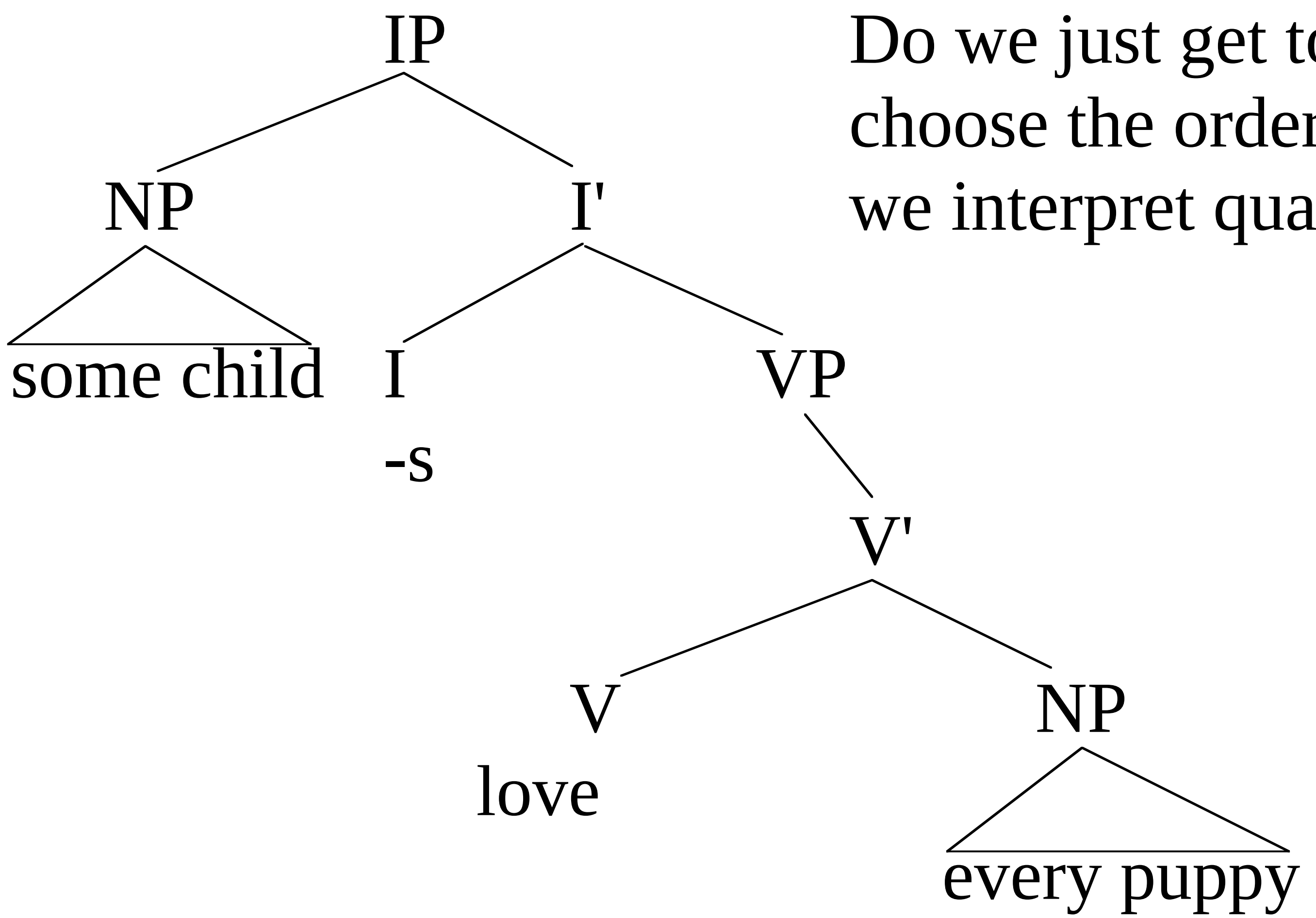
-->just saw how to get this ambiguity to follow from different orders of quantifier interpretation.

Quantifier Scope Ambiguity



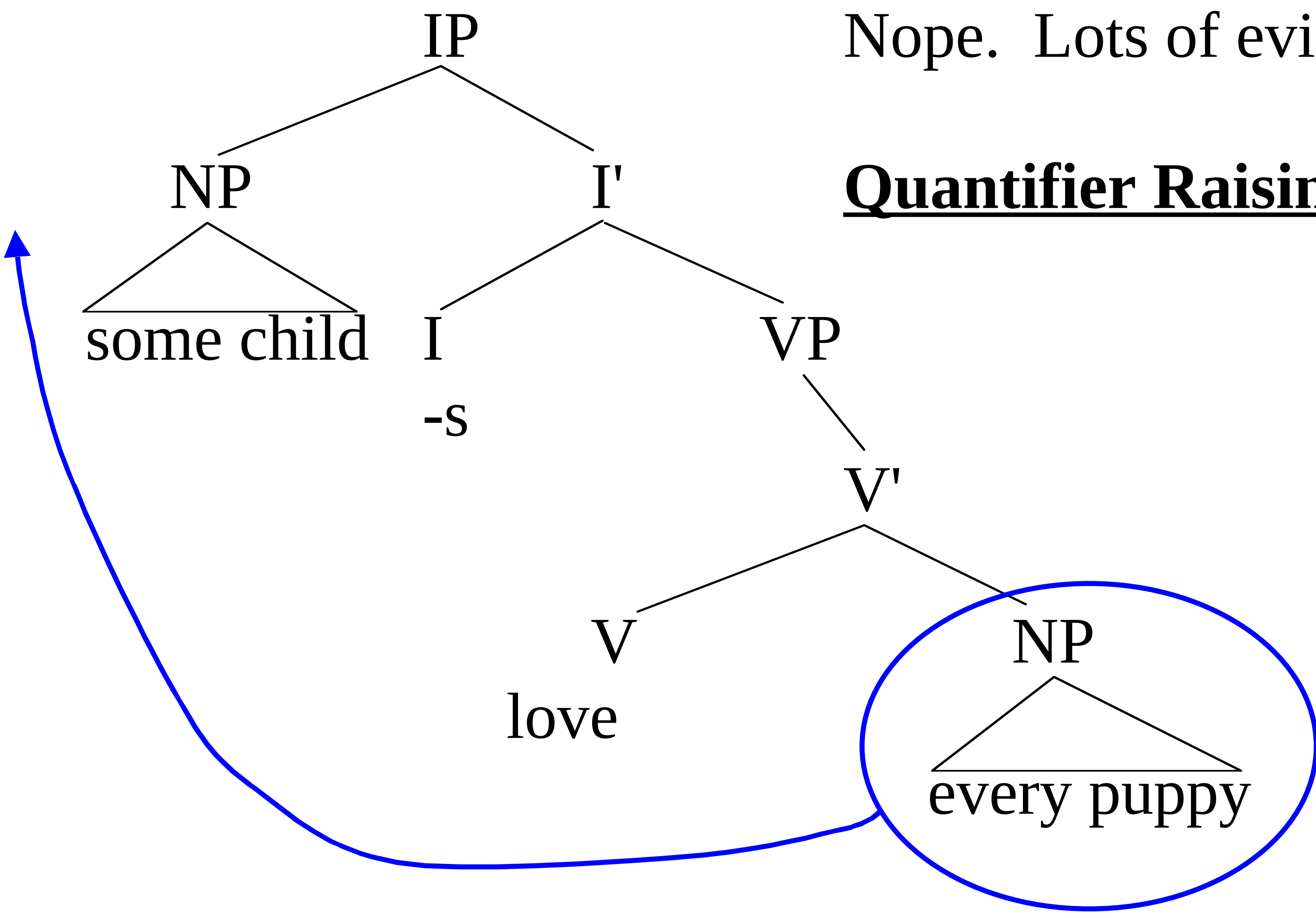
So why is this tree ambiguous?

Quantifier Scope Ambiguity



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

Quantifier Scope Ambiguity



Nope. Lots of evidence:

Quantifier Raising

Binding Theory

Susan likes herself.

Susan likes her.

Binding Theory

Susan$_a$ likes herself$_a$.

Susan$_a$ likes her$_b$.

Binding Theory

Susan_a likes herself_a.

Susan_a likes her_b.

*Susan_a likes herself_b.

*Susan_a likes her_a.

Binding Theory

Susan$_a$ likes herself$_a$.

Susan$_a$ likes **her**$_b$.

*Susan$_a$ likes herself$_b$.

*Susan$_a$ likes **her**$_a$.

pronouns cannot corefer with anything in the sentence.

Binding Theory

Susan$_a$ likes **herself**$_a$.

Susan$_a$ likes **her**$_b$.

*Susan$_a$ likes **herself**$_b$.

*Susan$_a$ likes **her**$_a$.

anaphors must corefer with something.

pronouns cannot corefer with anything in the sentence.

Binding Theory

anaphors must corefer with something?

Susan$_a$ likes **herself**$_a$.
*Susan$_a$ likes **herself**$_b$.

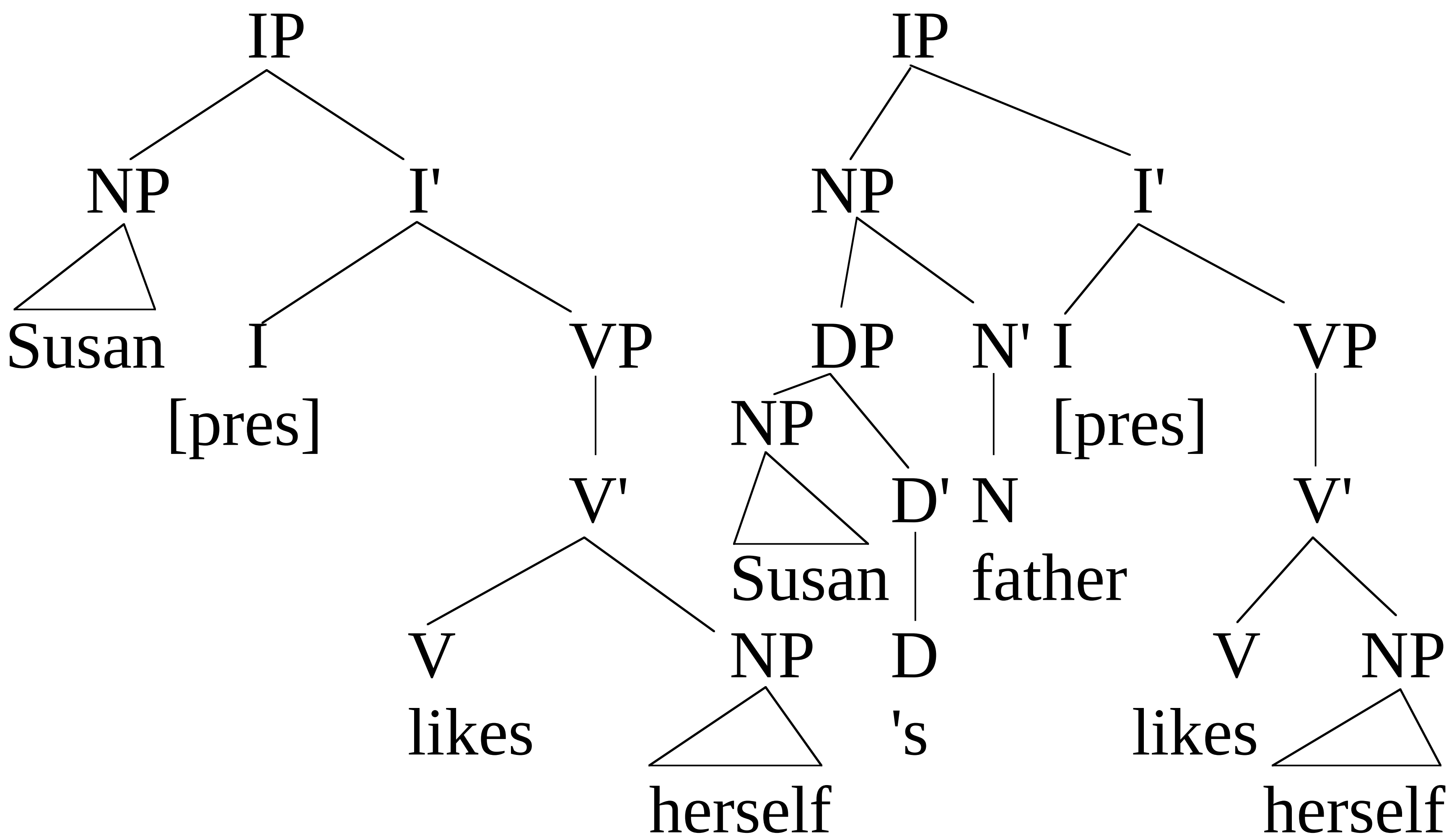
Binding Theory

anaphors must corefer with something?

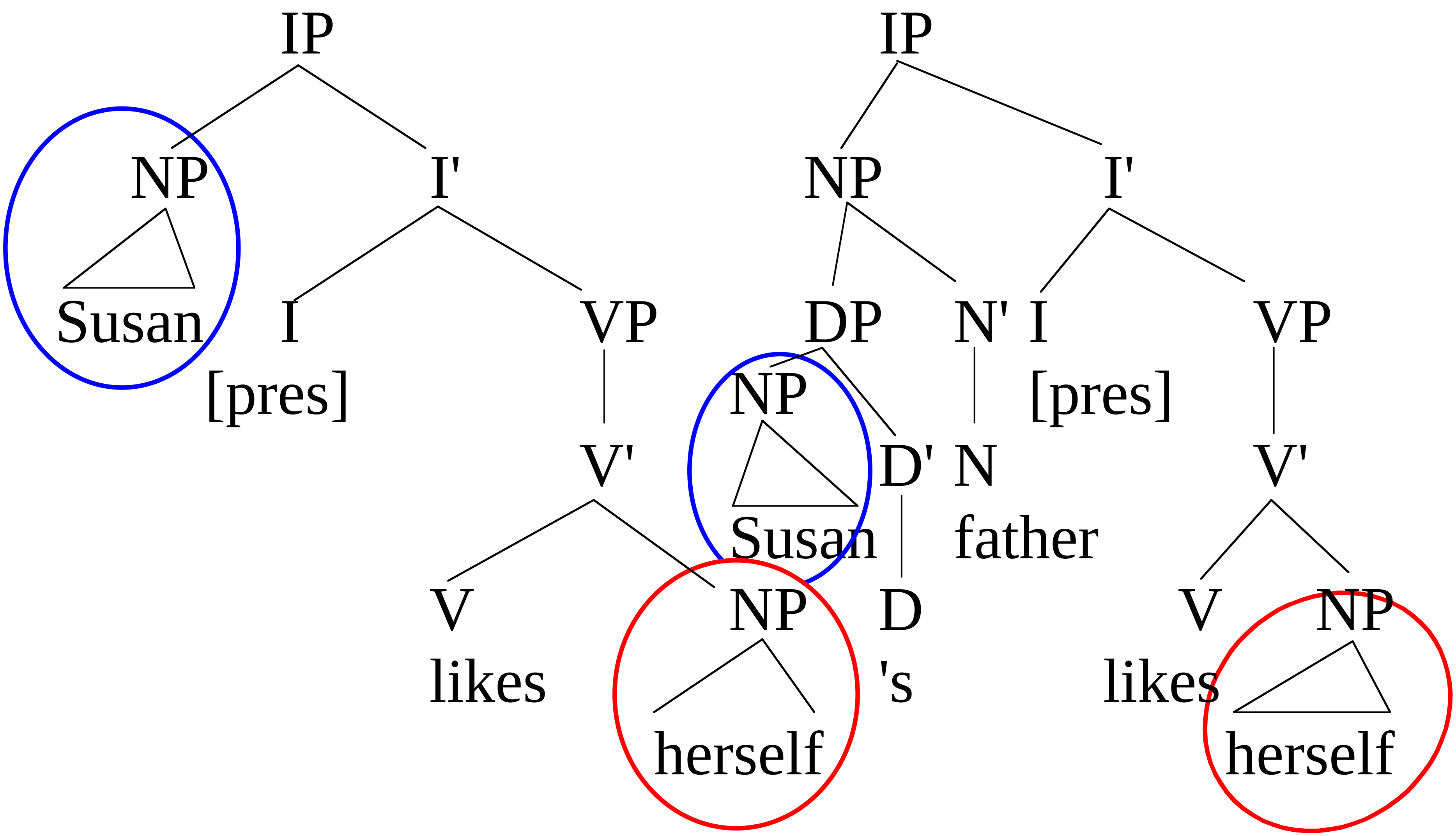
Susan$_a$ likes **herself**$_a$.
*Susan$_a$ likes **herself**$_b$.

*Susan$_a$'s father likes **herself**$_a$.

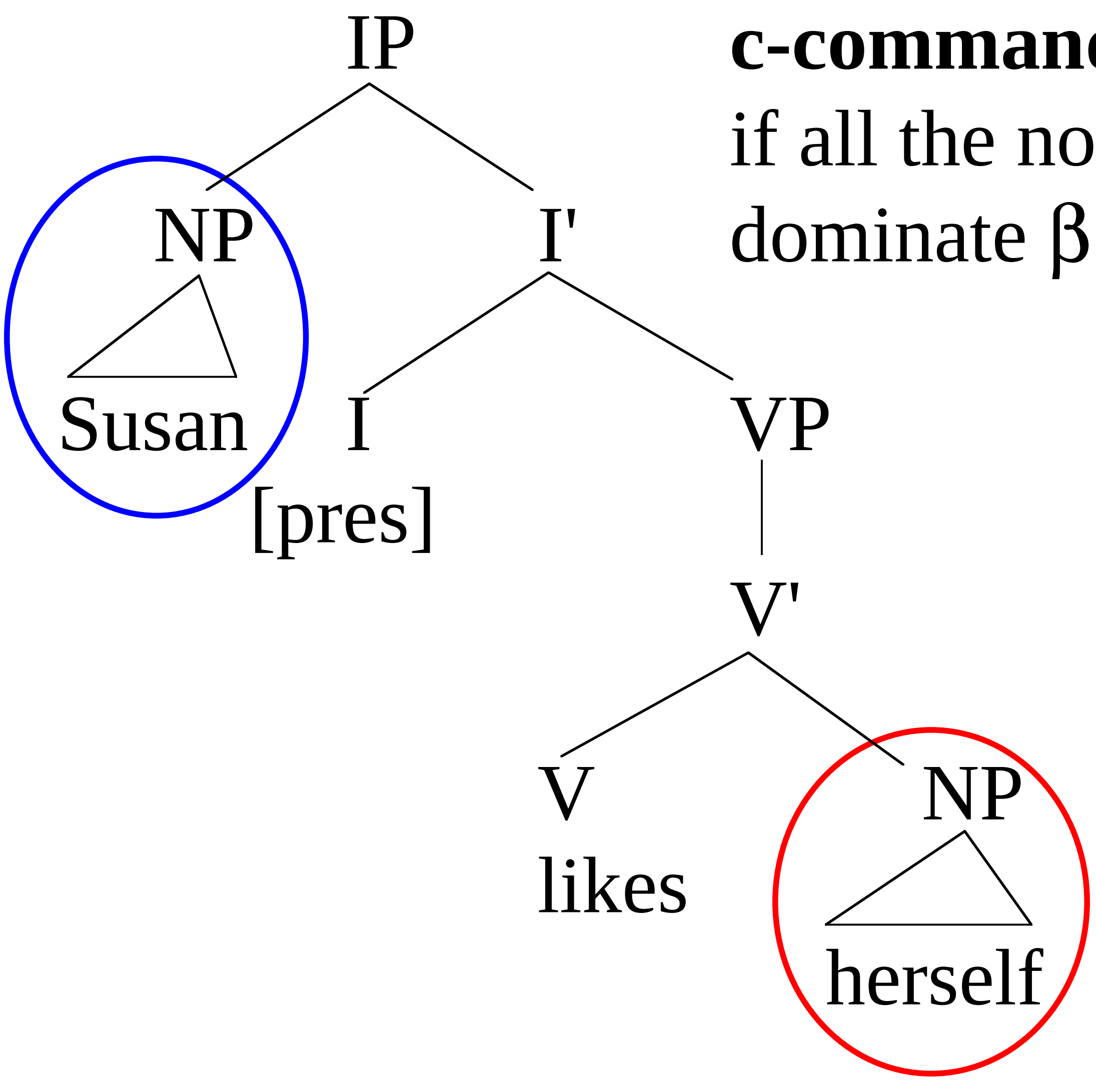
Binding Theory



Binding Theory

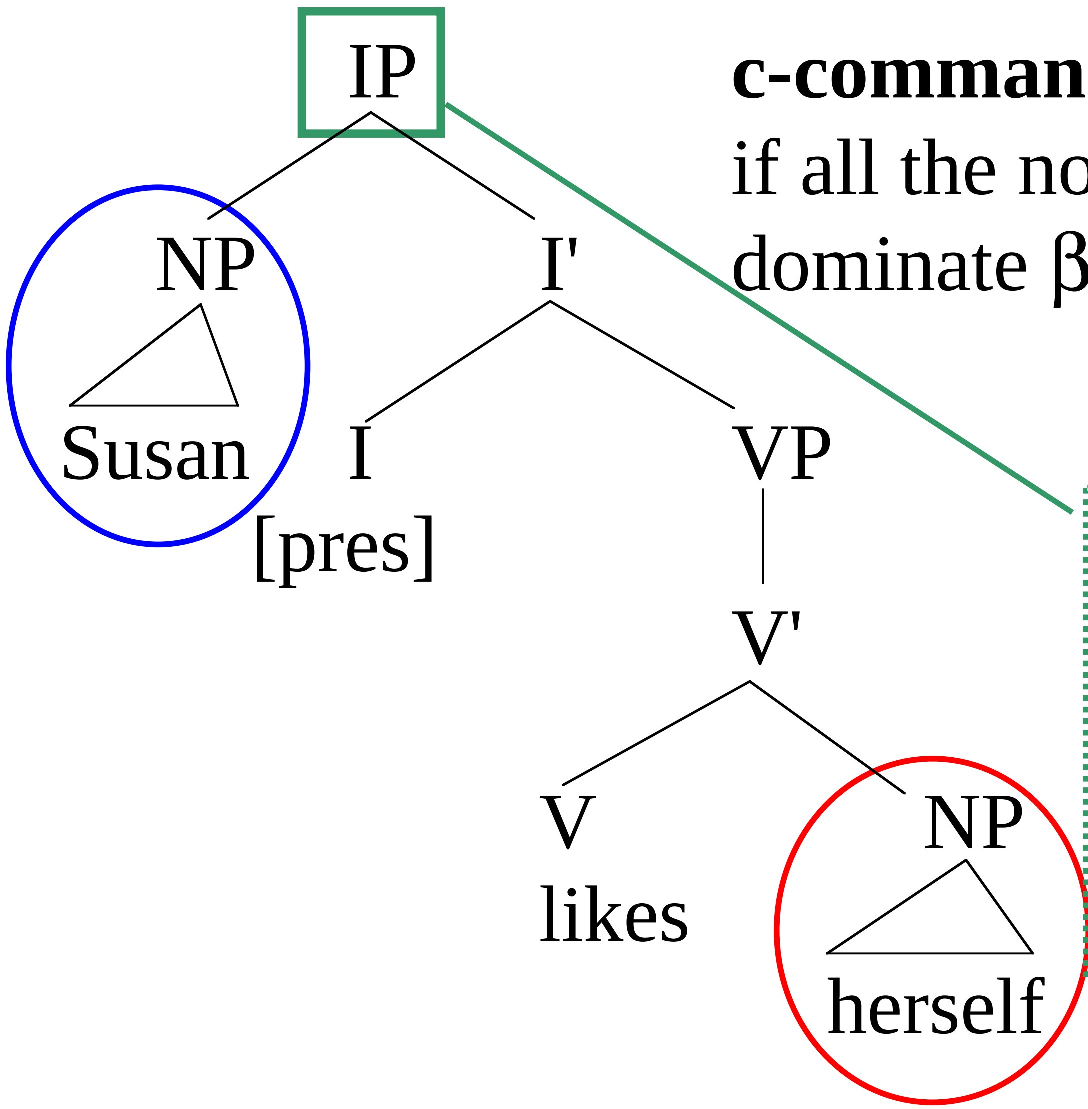


Binding Theory



c-command: α c-commands β if all the nodes dominating α dominate β.

Binding Theory

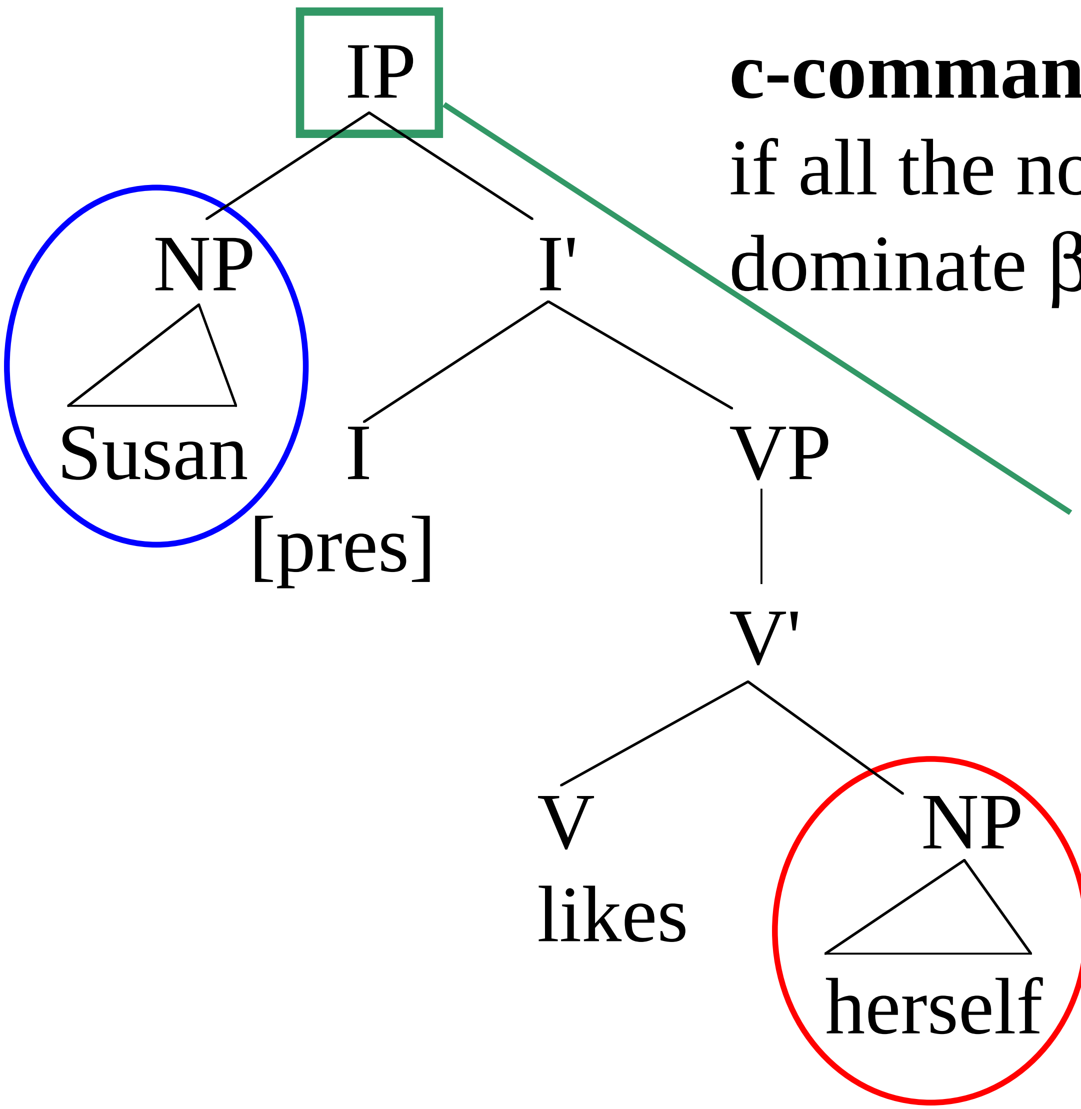


c-command: α c-commands β if all the nodes dominating α dominate β.

only node dominating the NP *Susan* also dominates the NP *herself*.

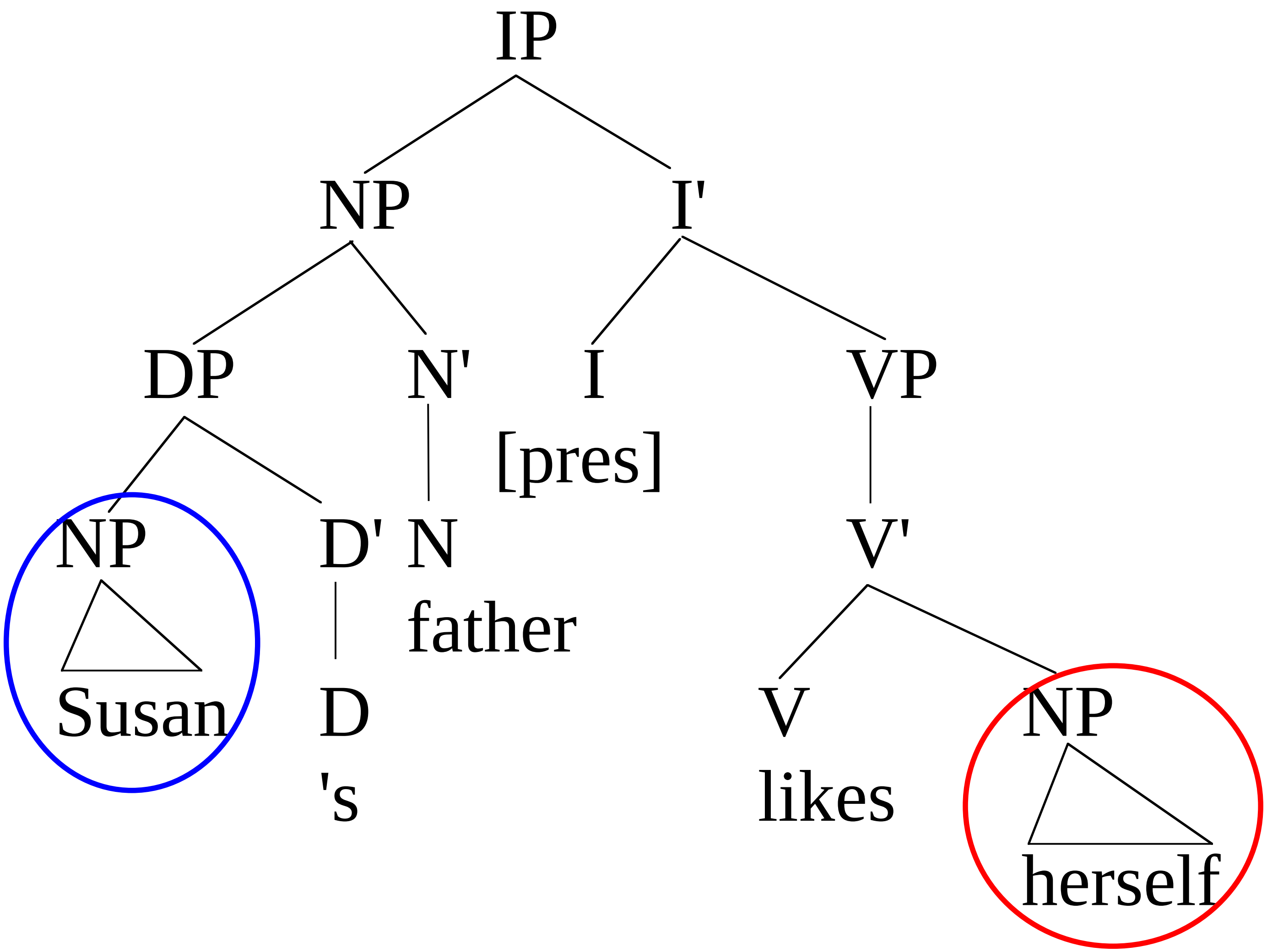
Binding Theory

c-command: α c-commands β if all the nodes dominating α dominate β.

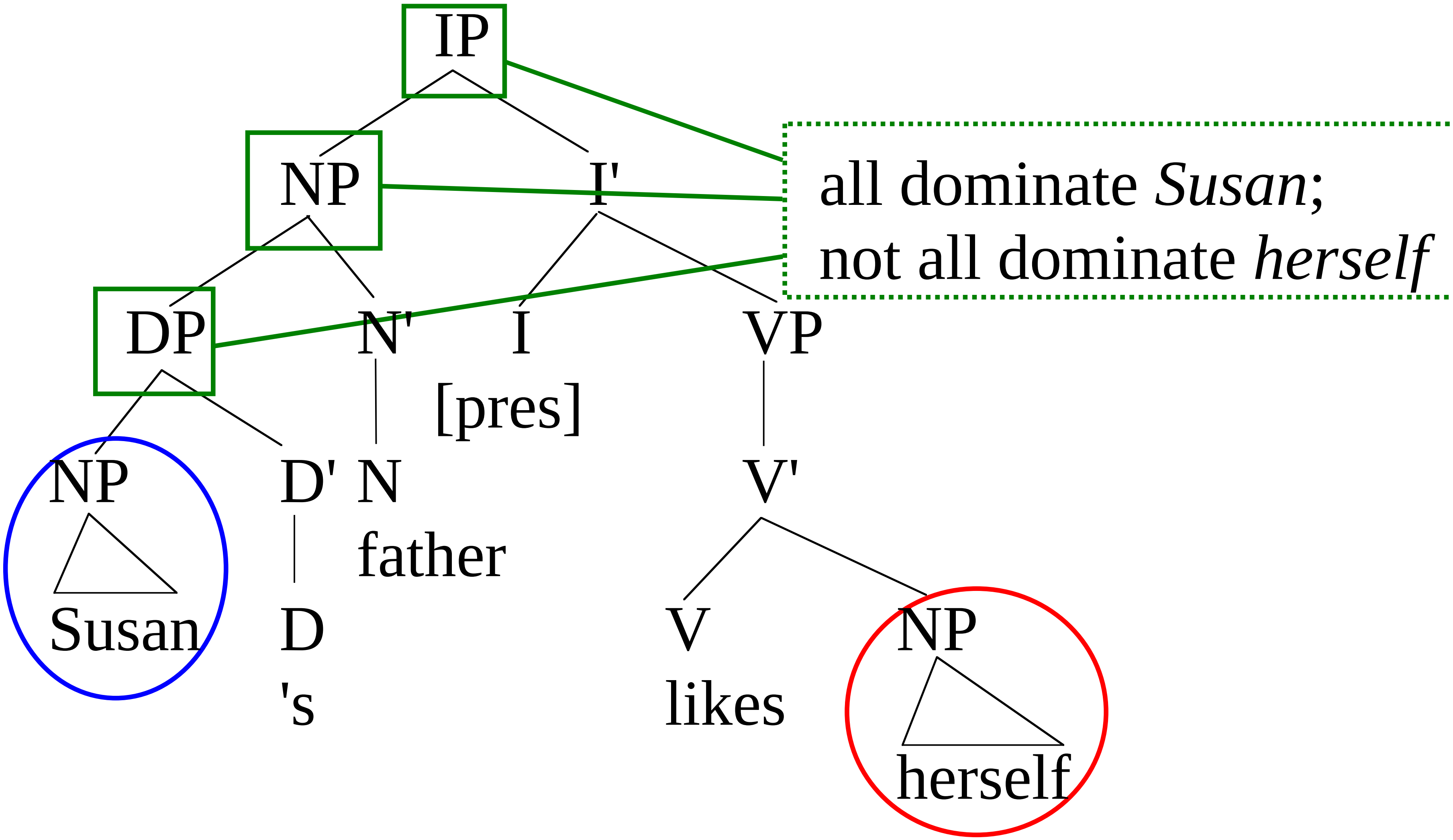


-->*Susan* c-commands *herself*.

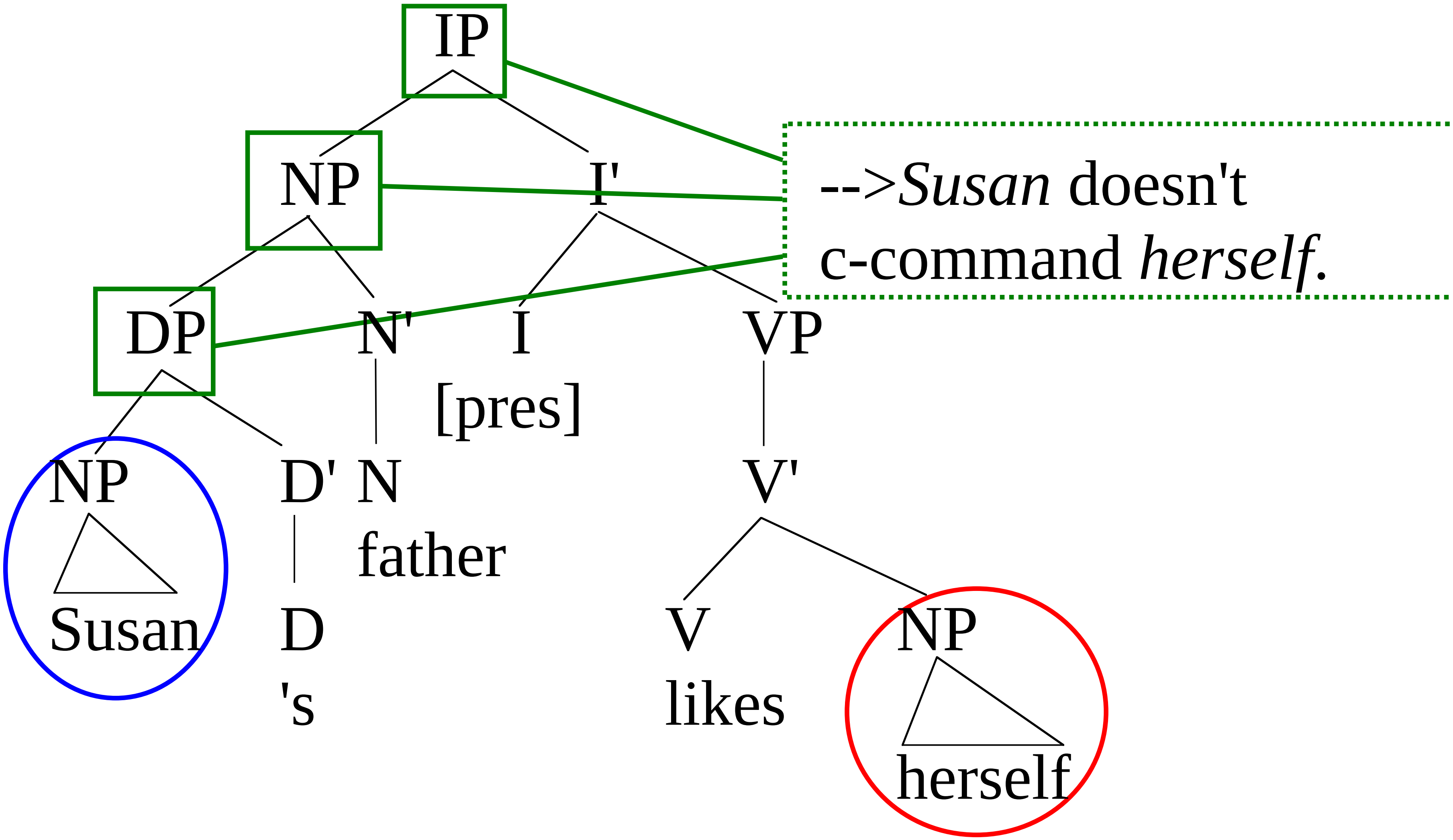
Binding Theory



Binding Theory



Binding Theory



Binding Theory

anaphors (words like *herself*, *myself*, etc.) must be c-commanded by something that corefers with them.

Binding Theory

anaphors (words like *herself*, *myself*, etc.) must be c-commanded by something that corefers with them.

α **binds** β if α c-commands and corefers with β.

Binding Theory

anaphors must be bound.

Binding Theory

anaphors must be bound.

anaphors include: **reflexives** (*herself*)
reciprocals (*each other*)

[John and Bill] like **each other**
* [John and Bill]'s father likes **each other**

Binding Theory

anaphors must be bound.
pronouns must be free (=not bound)

Susan$_a$ likes **herself**$_a$.
*Susan$_a$'s father likes **herself**$_a$.
*Susan$_a$ likes **her**$_a$.
Susan$_a$'s father likes **her**$_a$.

Binding Theory

Susan$_a$ likes **herself**$_a$.

I told Susan$_a$ about **herself**$_a$.

Binding Theory

Susan$_a$ likes **herself**$_a$.

I told Susan$_a$ about **herself**$_a$.

***Herself**$_a$ likes Susan$_a$.

Binding Theory

Susan$_a$ likes **herself**$_a$.

*Susan$_a$ thinks I like **herself**$_a$.

Binding Theory

Susan$_a$ likes **herself**$_a$.

*Susan$_a$ thinks I like **herself**$_a$.

Principle A:
anaphors must be bound...within IP.

Binding Theory

*Susan$_a$ likes **her**$_a$.

Susan$_a$ thinks I like **her**$_a$.

Principle A:
anaphors must be bound...within IP.
Principle B:
pronouns must be free...within IP.

Binding Theory

*She_a likes $Susan_a$.

Her_a father likes $Susan_a$.

Principle A:
anaphors must be bound within IP.
Principle B:
pronouns must be free within IP.

Binding Theory

*She$_a$ likes Susan$_a$.

Her$_a$ father likes Susan$_a$.

Principle A:
anaphors must be bound within IP.

Principle B:
pronouns (and names?) must be free within IP.

Binding Theory

Susan$_a$ thinks I like her$_a$.
*She$_a$ thinks I like Susan$_a$.

Principle A:
anaphors must be bound within IP.
Principle B:
pronouns ~~(and names?)~~ must be free within IP.

Binding Theory

Susan$_a$ thinks I like her$_a$.
*She$_a$ thinks I like Susan$_a$.

Principle A:
anaphors must be bound within IP.

Principle B:
pronouns ~~(and names?)~~ must be free within IP.

Principle C:
"R-expressions" must be free.

Binding Theory

[While **she** was eating], **Susan** read a book.

*__She__ read a book while **Susan** was eating.