

Binding Theory

Describing Relationships between Nouns

Binding Theory

- Describes the conditions on the structural relations between nouns.
- Concerned with three types of nouns:
 - **R-expressions** (proper names, common nouns)
 - **Pronouns**. (he, she, it, his, one, them, him etc)
 - **Anaphors**. (eg. himself, herself, themselves)
- These NPs are semantically distinct, but they also have different syntactic distributions.

R-expressions

- Express content
- An NP that gets its meaning by referring to an entity in the world.
- e.g. Bill Clinton, William, The woman in the blue suit, a teddy bear, purple shoes.

Anaphor

- An NP that obligatorily gets its meaning from another NP in the sentence.
- Heidi bopped herself on the head with a zucchini
- myself, yourself, himself, herself, itself, oneself, ourselves, yourselves, themselves, each other.

Pronouns

- Pronoun: An NP that may (but need not) get its meaning from another word in the sentence. It can also get its meaning from a noun previously mentioned in the discourse, or by context.
- Art said that **he** played basketball
 - Art said that Art played basketball
 - Art said that David played basketball
- I, me, you, he, him, she, her, it, one, we, us, they, them, his, her, our, my, its, your, their.

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Category D, but count as pronouns

Antecedent

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- Each **index** (plural: indices) represents a different reference.
 - a) [Colin]_i gave [Andrea]_j [a basketball]_k
 - b) [Art]_i said that [he]_j played [basketball]_k in [the dark]_l
 - c) [Art]_i said that [he]_i played [basketball]_k in [the dark]_l
 - d) [Heidi]_i bopped [herself]_i on [the head]_j with [a zucchini]_k

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 - c) [Art]_i said that [he]_i played [basketball]_k in [the dark]_l
 - d) [Heidi]_i bopped [herself]_i on [the head]_j with [a zucchini]_k
- Start at the left and assign each NP an index starting with _i and working down the alphabet.

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- Two NPs that have the same index are said to be **co-indexed**.
- Two NPs that are co-indexed are said to **co-refer** (that is, refer to the same entity in the world)
 - a) [Art]_i said that [he]_j played [basketball]_k in [the dark]_l
 - b) [Art]_i said that [he]_i played [basketball]_k in [the dark]_l

Syntactic Restrictions on Anaphors

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- Heidi_i bopped herself_i on the head with a zucchini:
- [Heidi_i's mother]_k bopped herself_k on the head with a zucchini.

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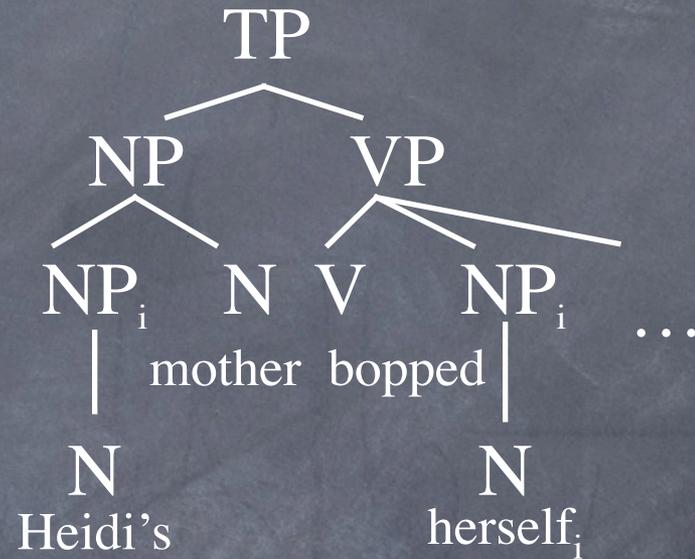
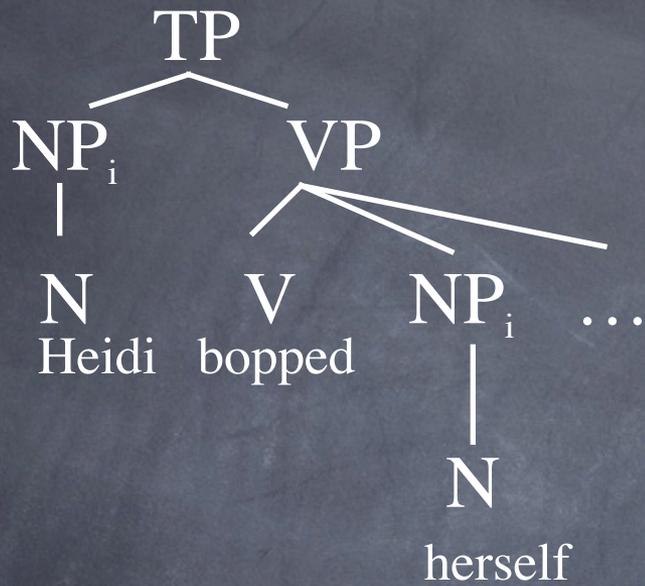
The antecedent for an anaphor can be the subject of the sentence, but not an NP inside the subject.

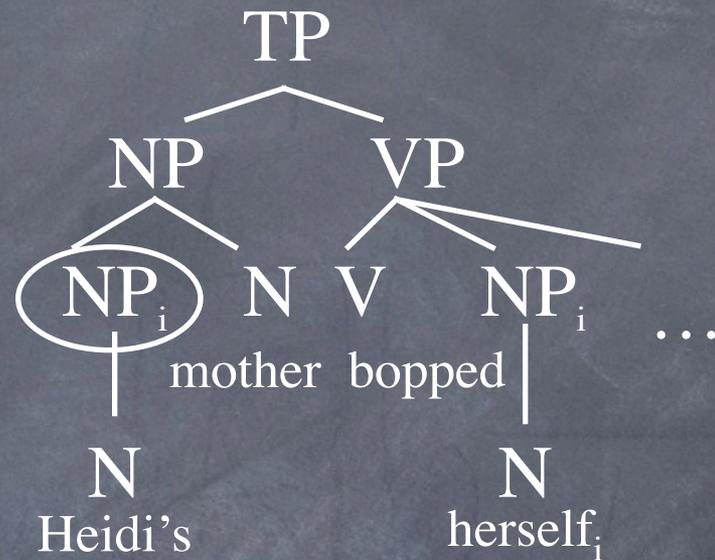
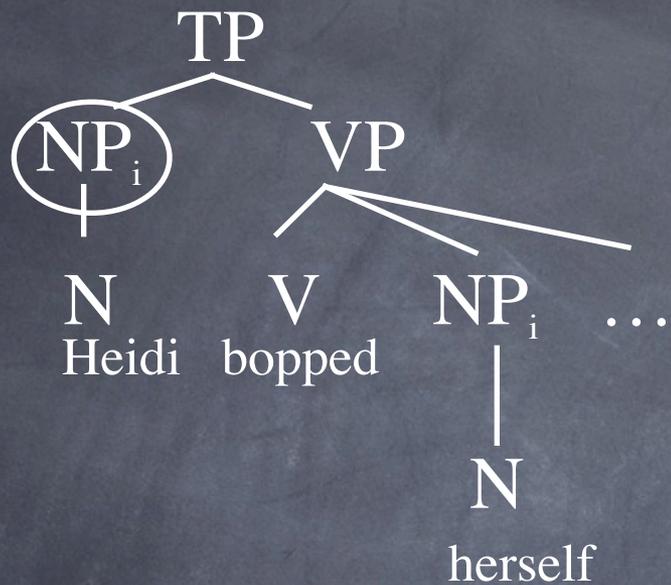
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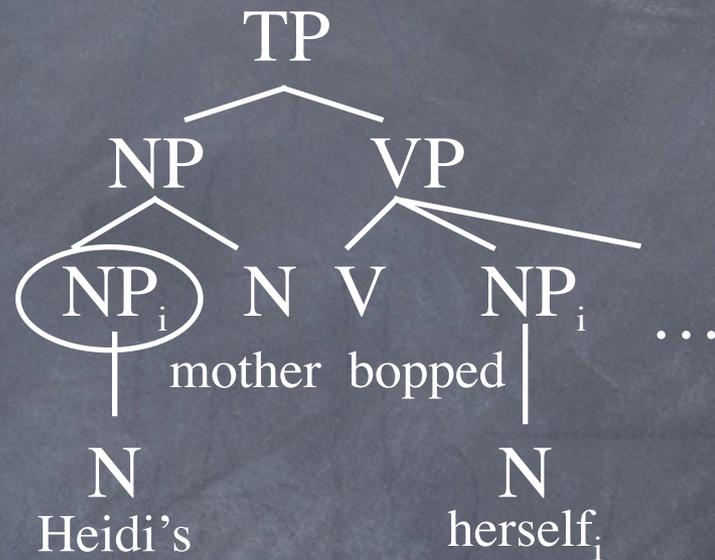
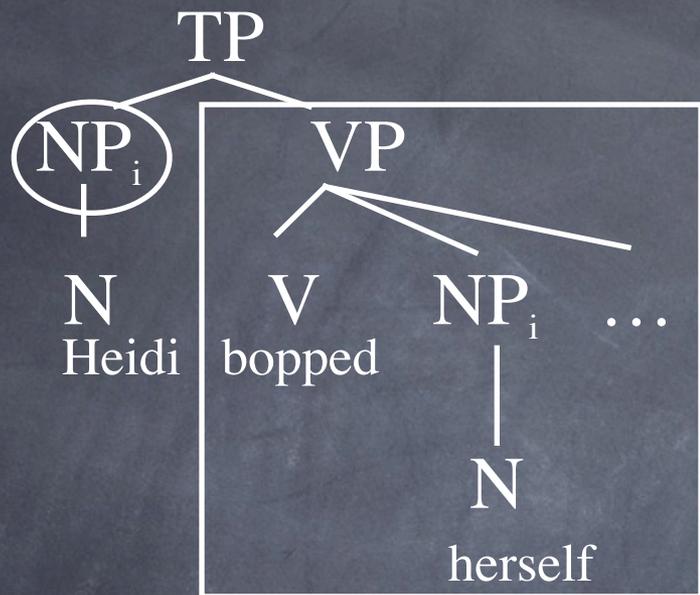
- Heidi_i bopped herself_i on the head with a zucchini:
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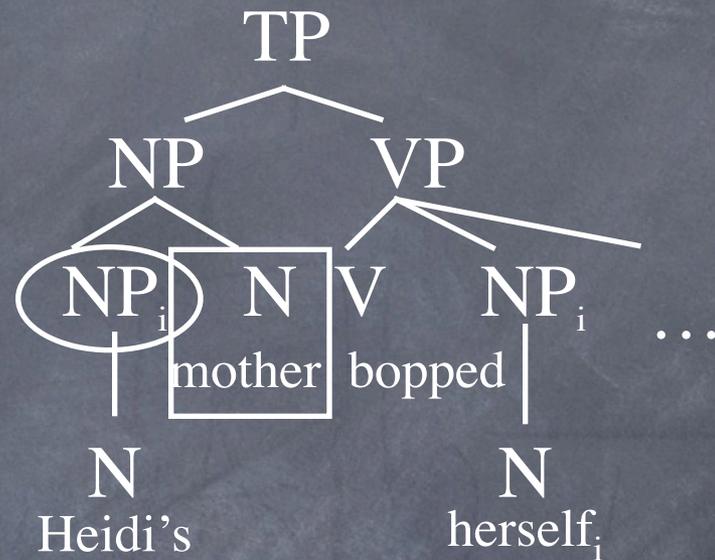
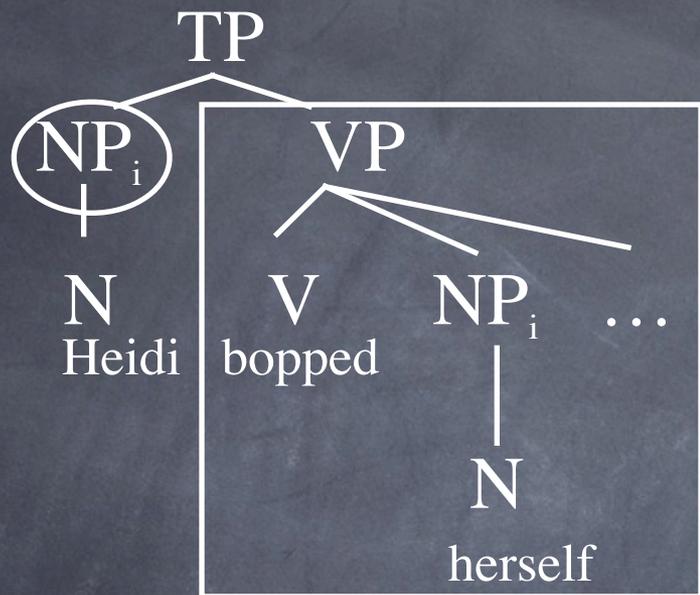
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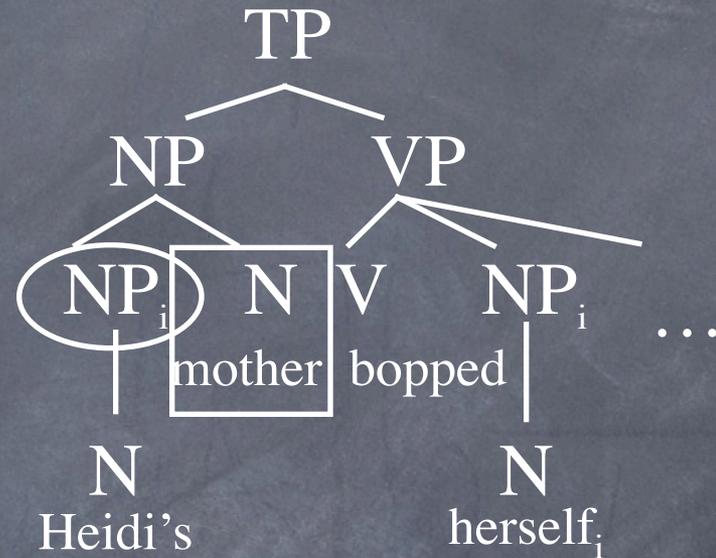
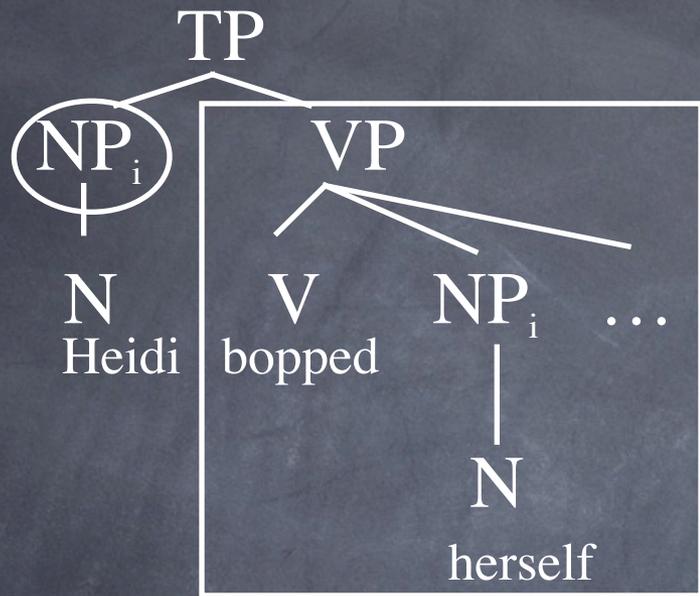
let's look at this distinction in terms of structural relations



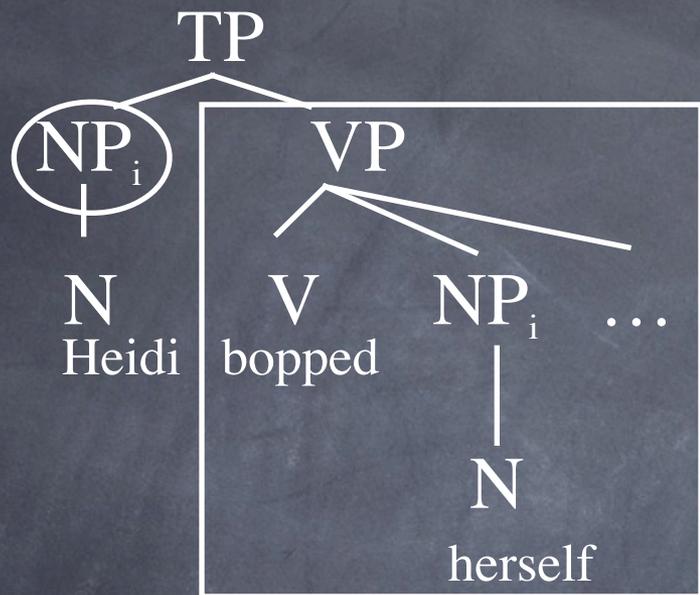




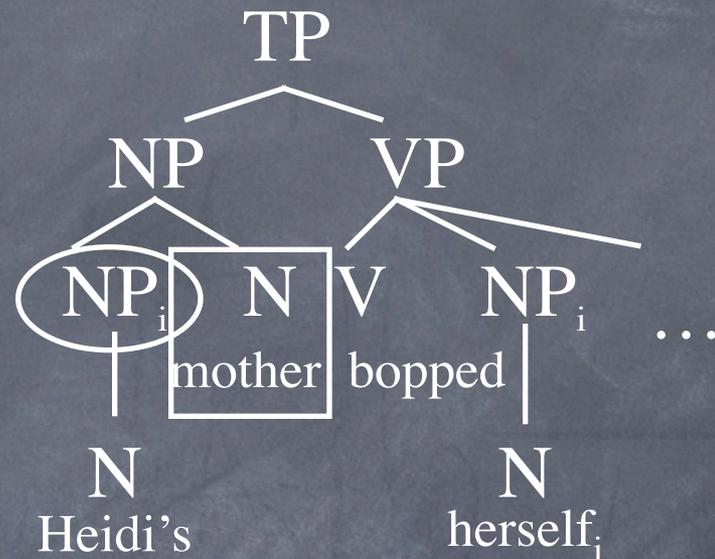




C-commanded by
[_{NP}Heidi]



C-commanded by
[_{NP}Heidi]



Not C-commanded by
[_{NP}Heidi]

Binding

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- **Binds:**
 - A binds B if and only if
 - A c-commands B AND
 - A and B are co-indexed.

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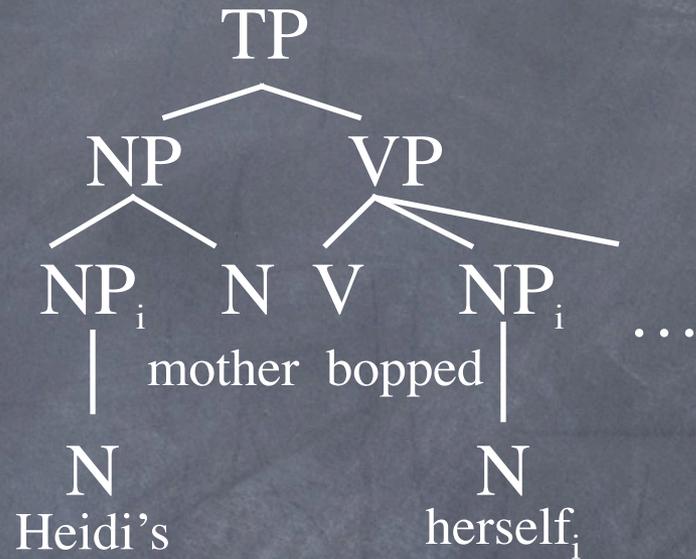
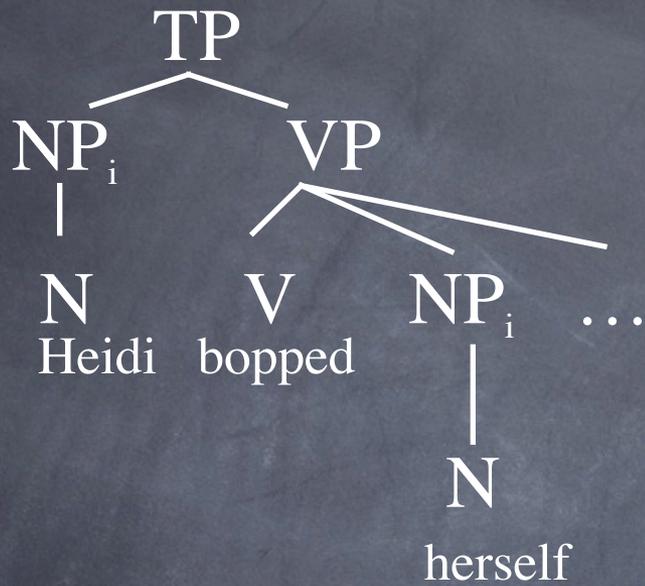
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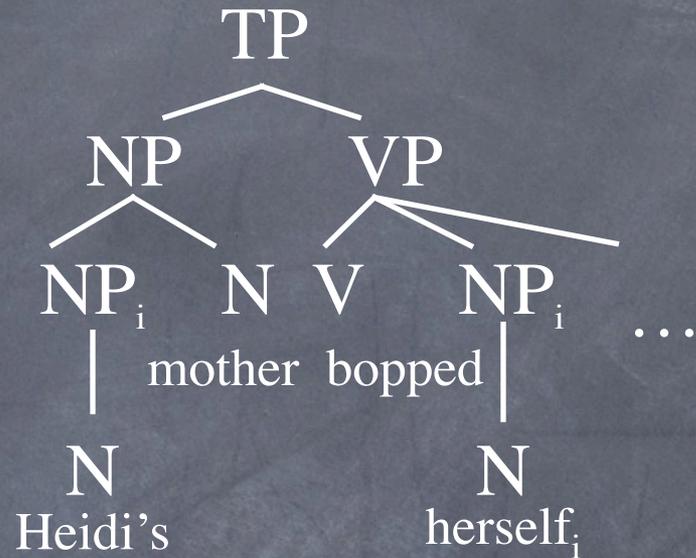
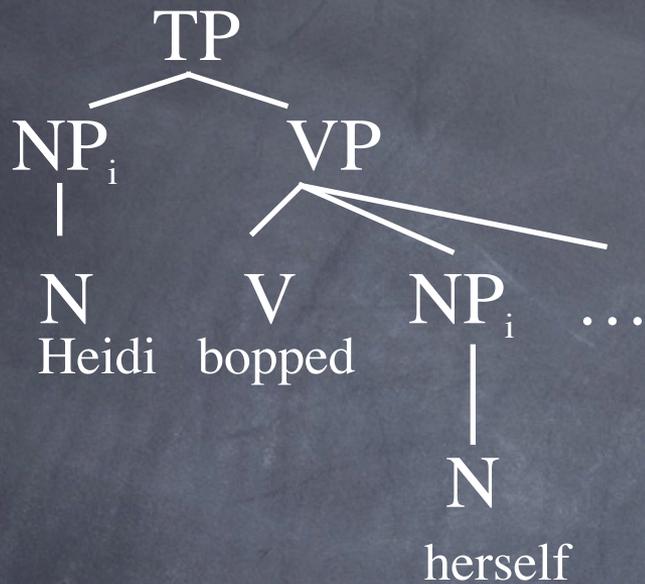
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- Binding is a SPECIAL kind of c-command. It is c-command with co-indexing.

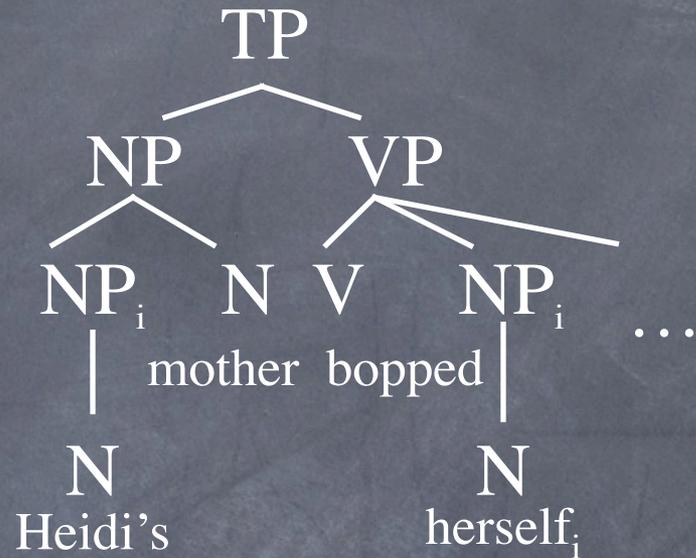
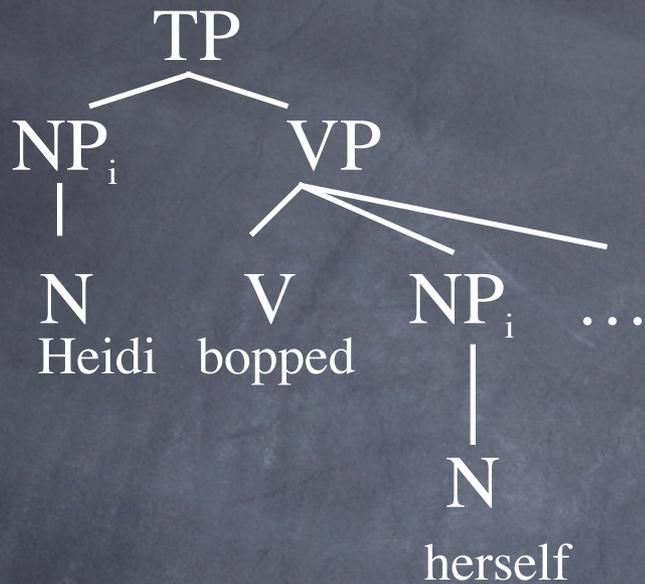
The Principle that deals with anaphors

- **Principle A** (to be revised): An anaphor must be bound
- In other words: An anaphor must be c-commanded and co-indexed by an antecedent.

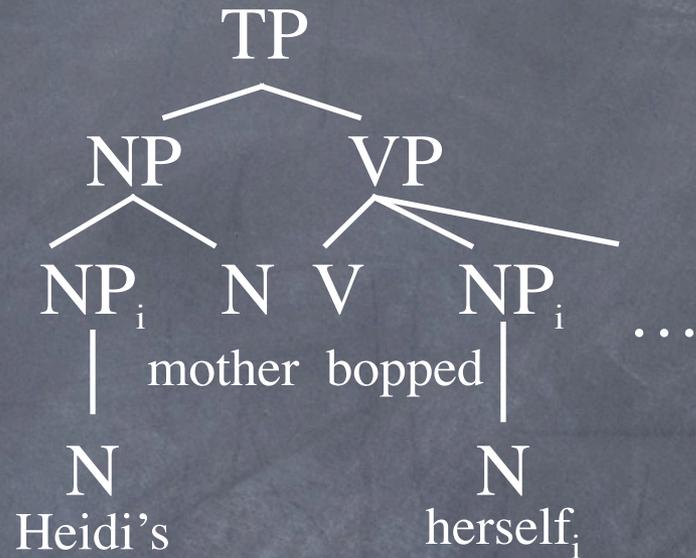
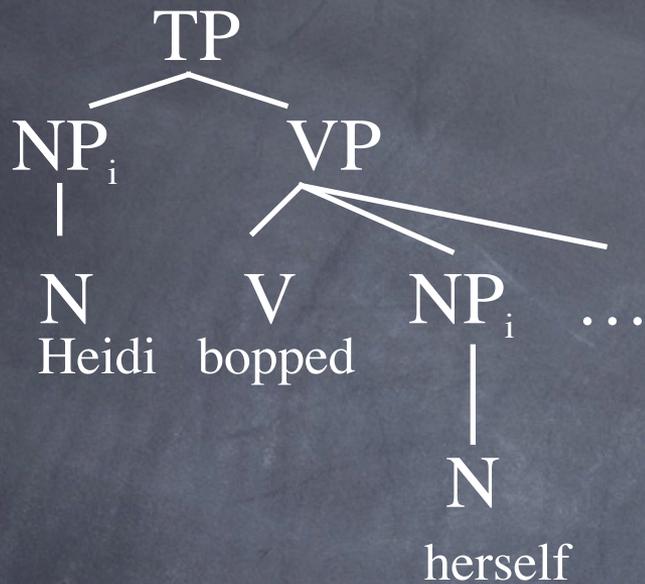




Coindexed?

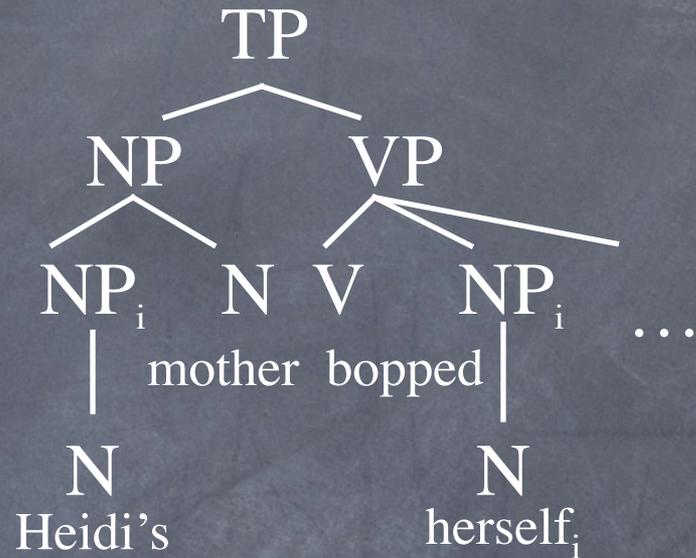
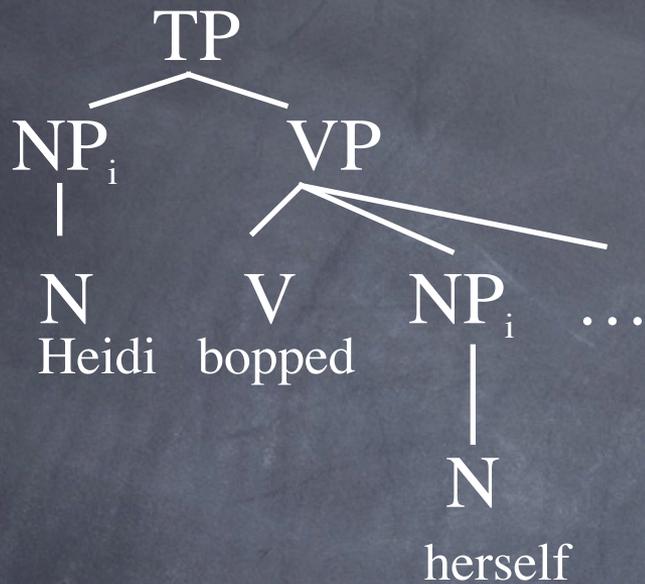


Coindexed? **yes**



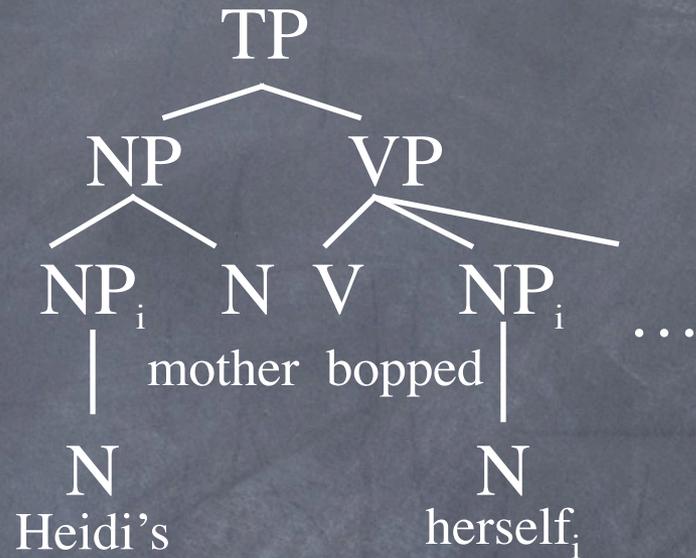
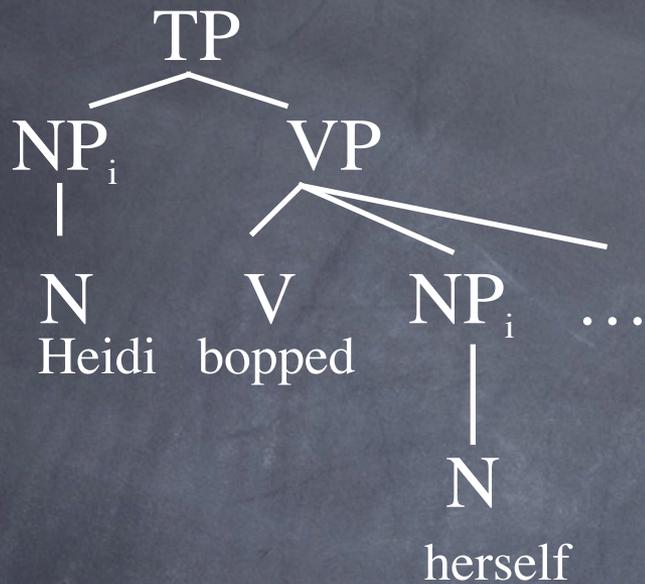
Coindexed? **yes**

C-command?



Coindexed? **yes**

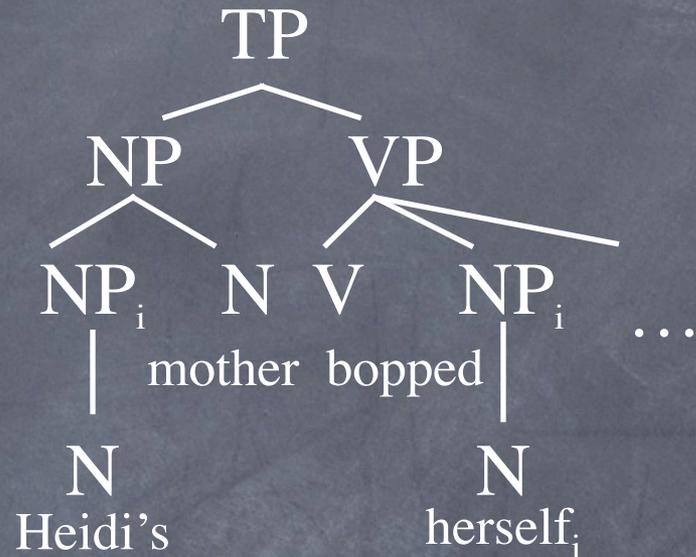
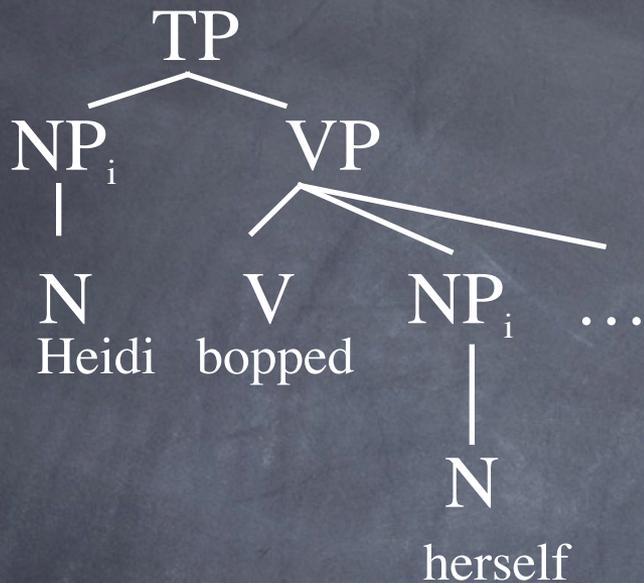
C-command? **yes**



Coindexed? **yes**

C-command? **yes**

∴ Bound

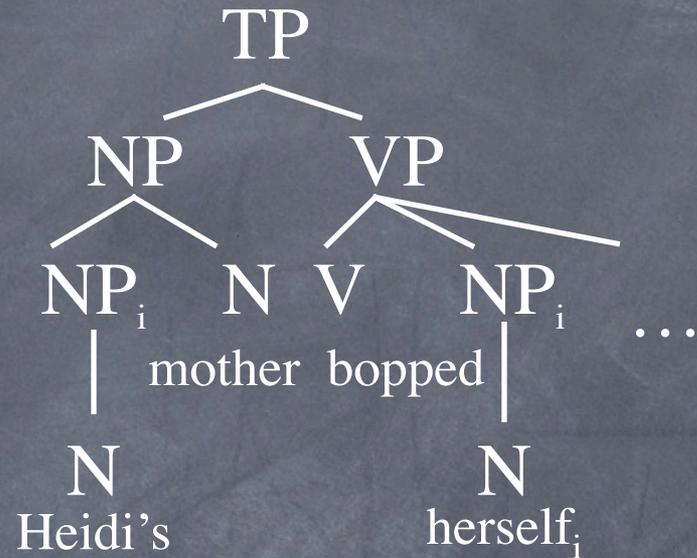
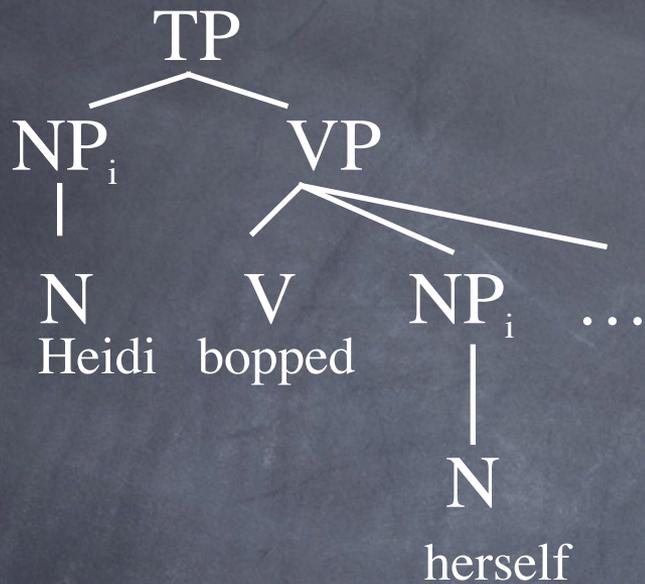


Coindexed? **yes**

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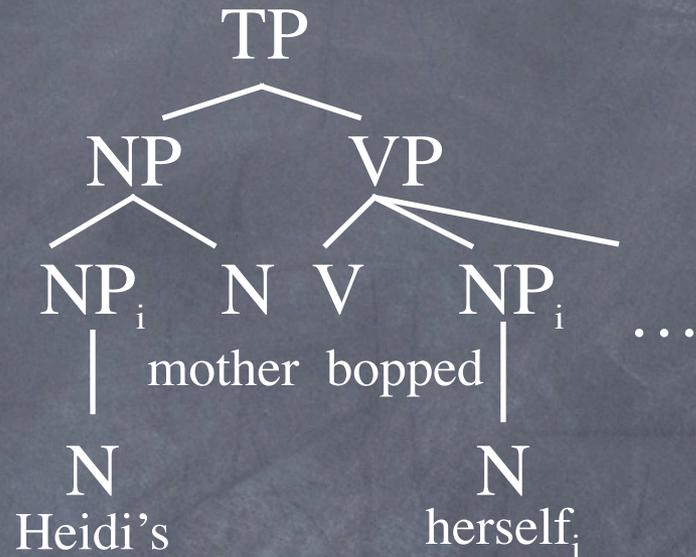
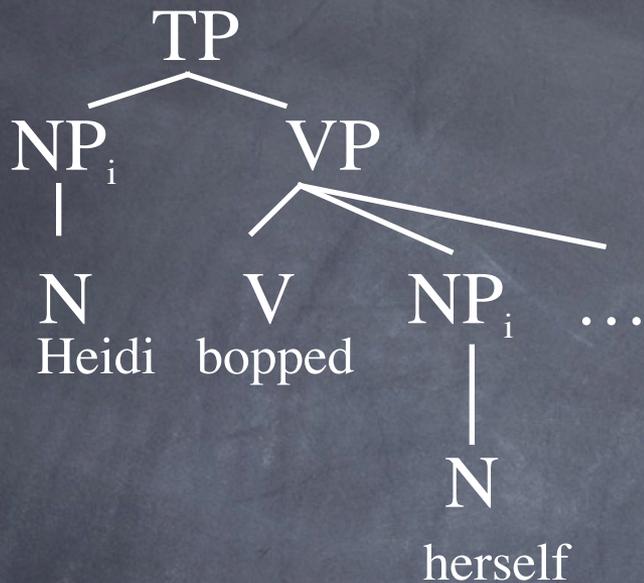


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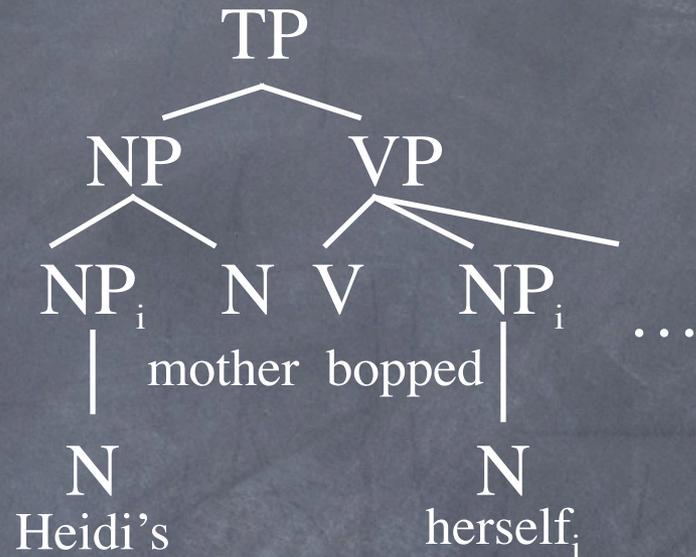
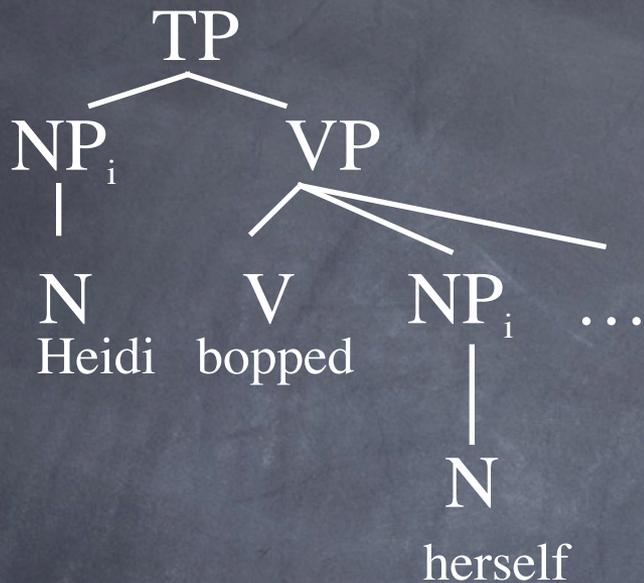
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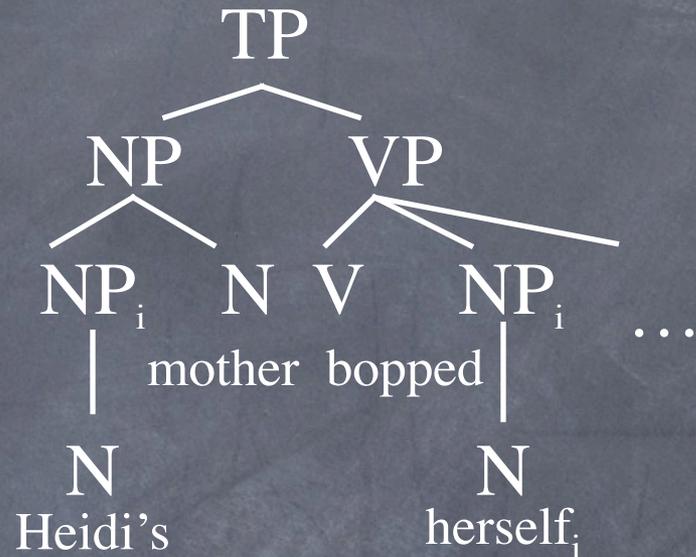
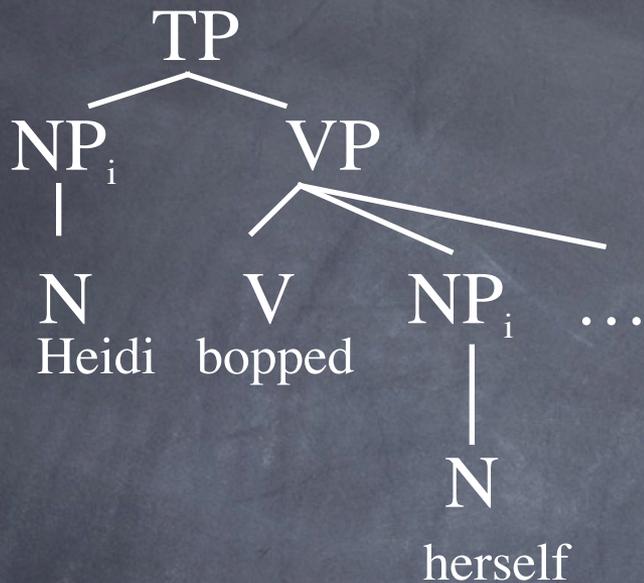
Coindexed? **yes**

C-command? **yes**

∴ Bound

Coindexed? **yes**

C-command? **no**



Coindexed? **yes**

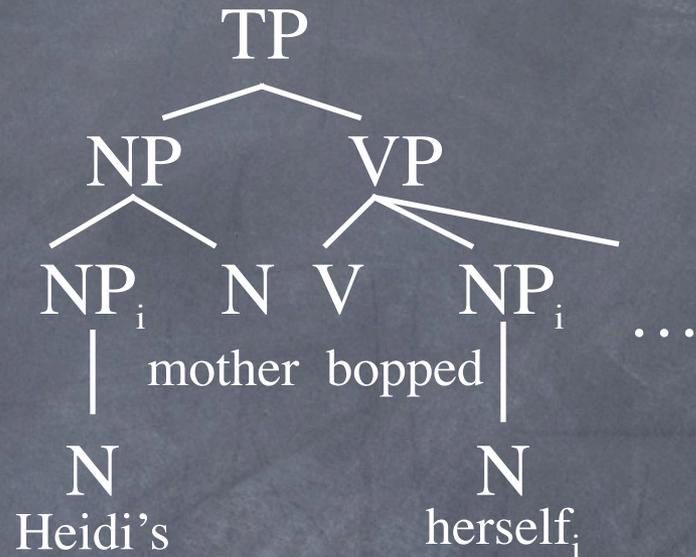
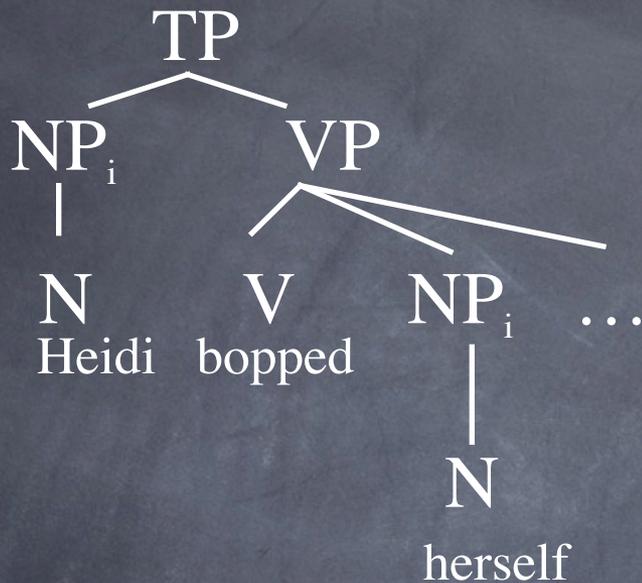
C-command? **yes**

∴ Bound

Coindexed? **yes**

C-command? **no**

∴ NOT Bound



Coindexed? **yes**

C-command? **yes**

∴ Bound

Coindexed? **yes**

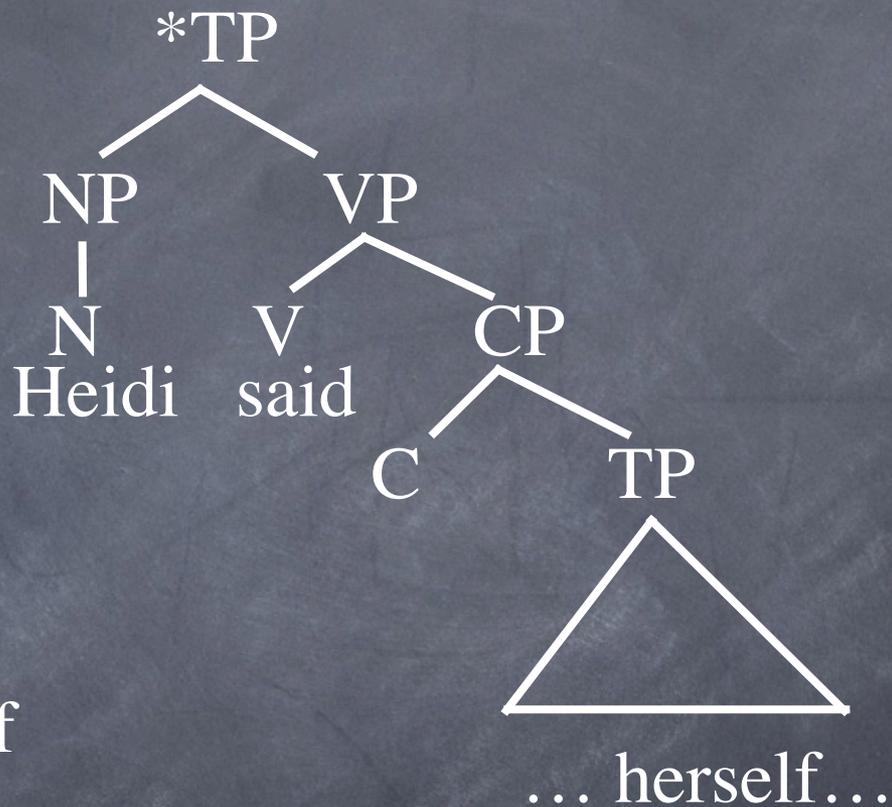
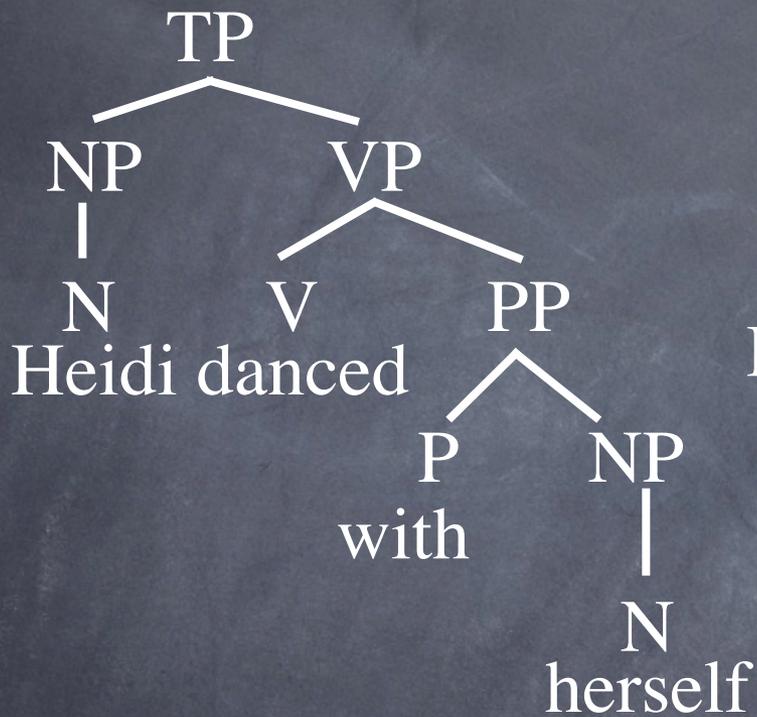
C-command? **no**

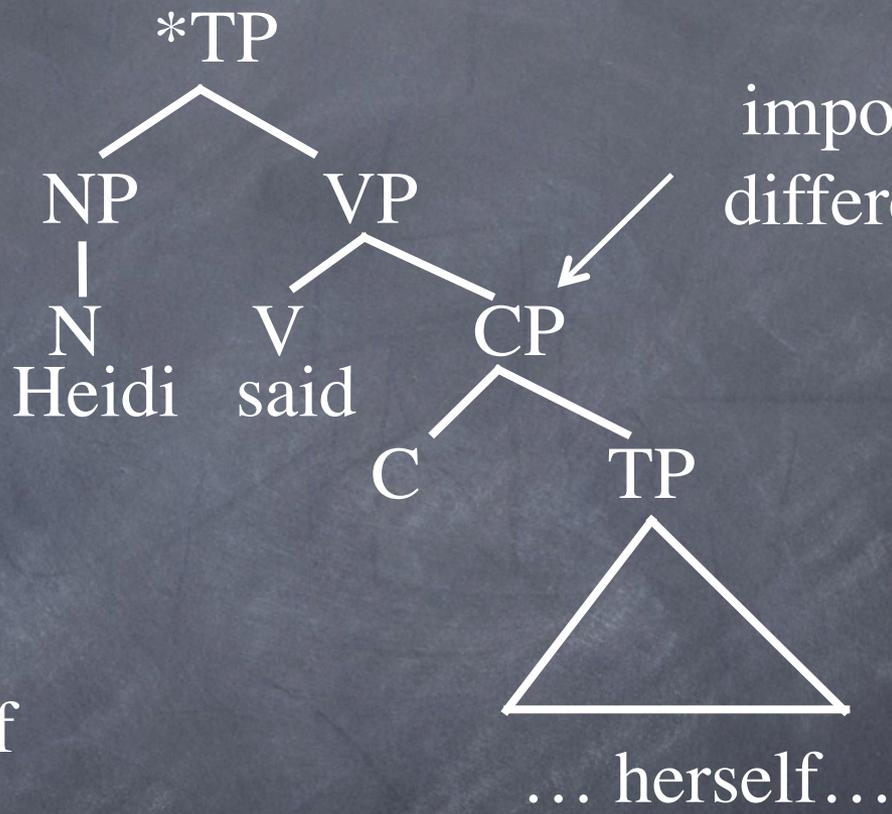
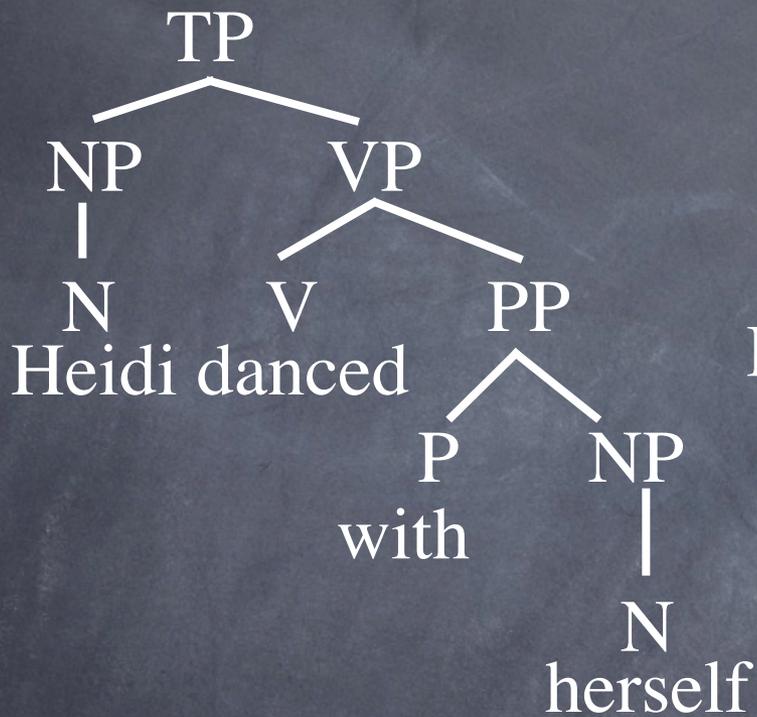
∴ NOT Bound

VIOLATES PRINCIPLE A

Locality restrictions on anaphor binding

- Heidi_i danced with herself_i
- *Heidi_i said that Art danced with herself_i
 - (cf. Heidi_i said that Art danced with her_i.)
- *Heidi_i said that herself_i danced with Art
 - (cf. Heidi_i said that she_i danced with Art)





important difference!

... herself...

Binding domain

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- **Binding domain:** The clause containing the anaphor

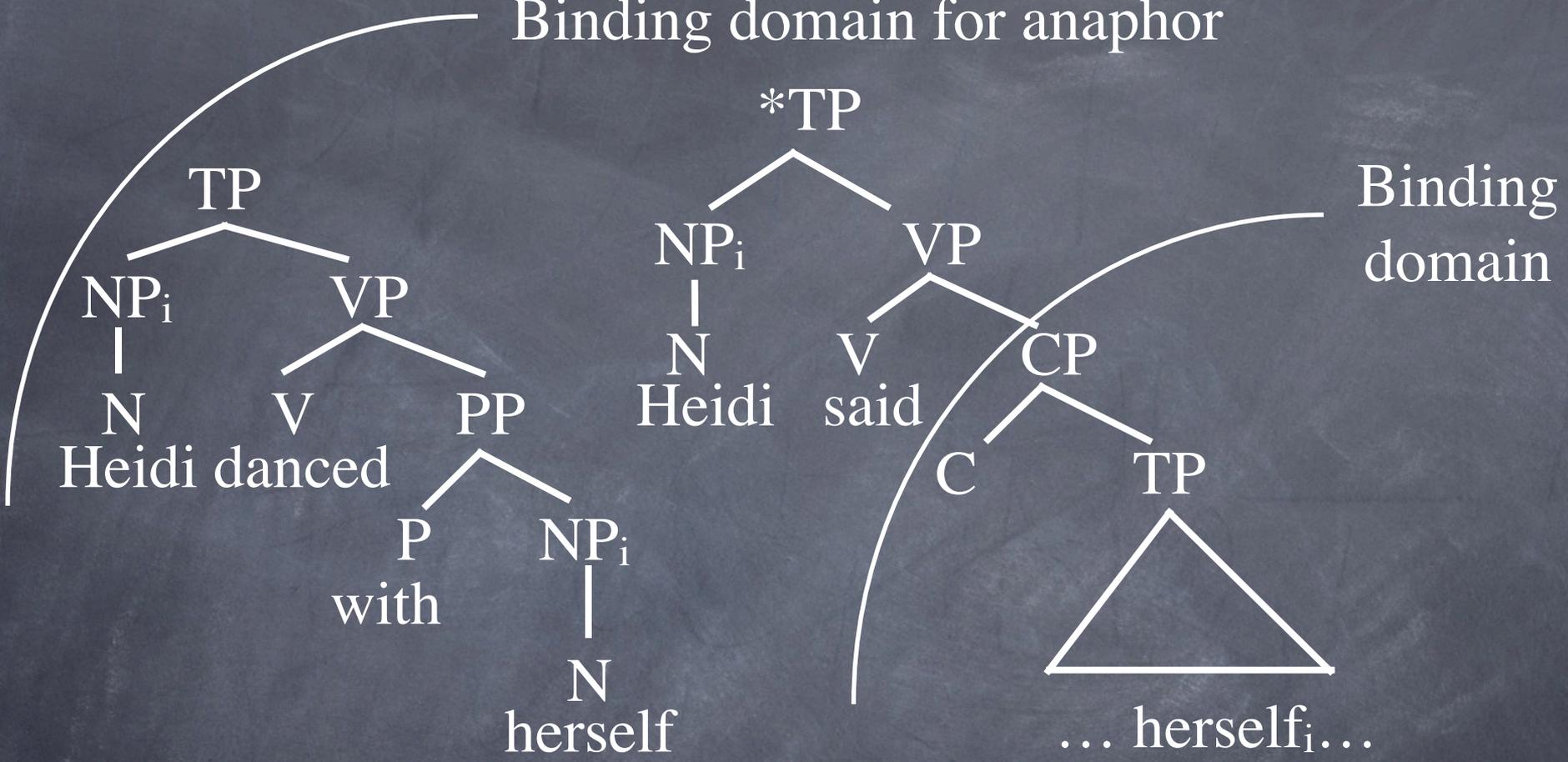
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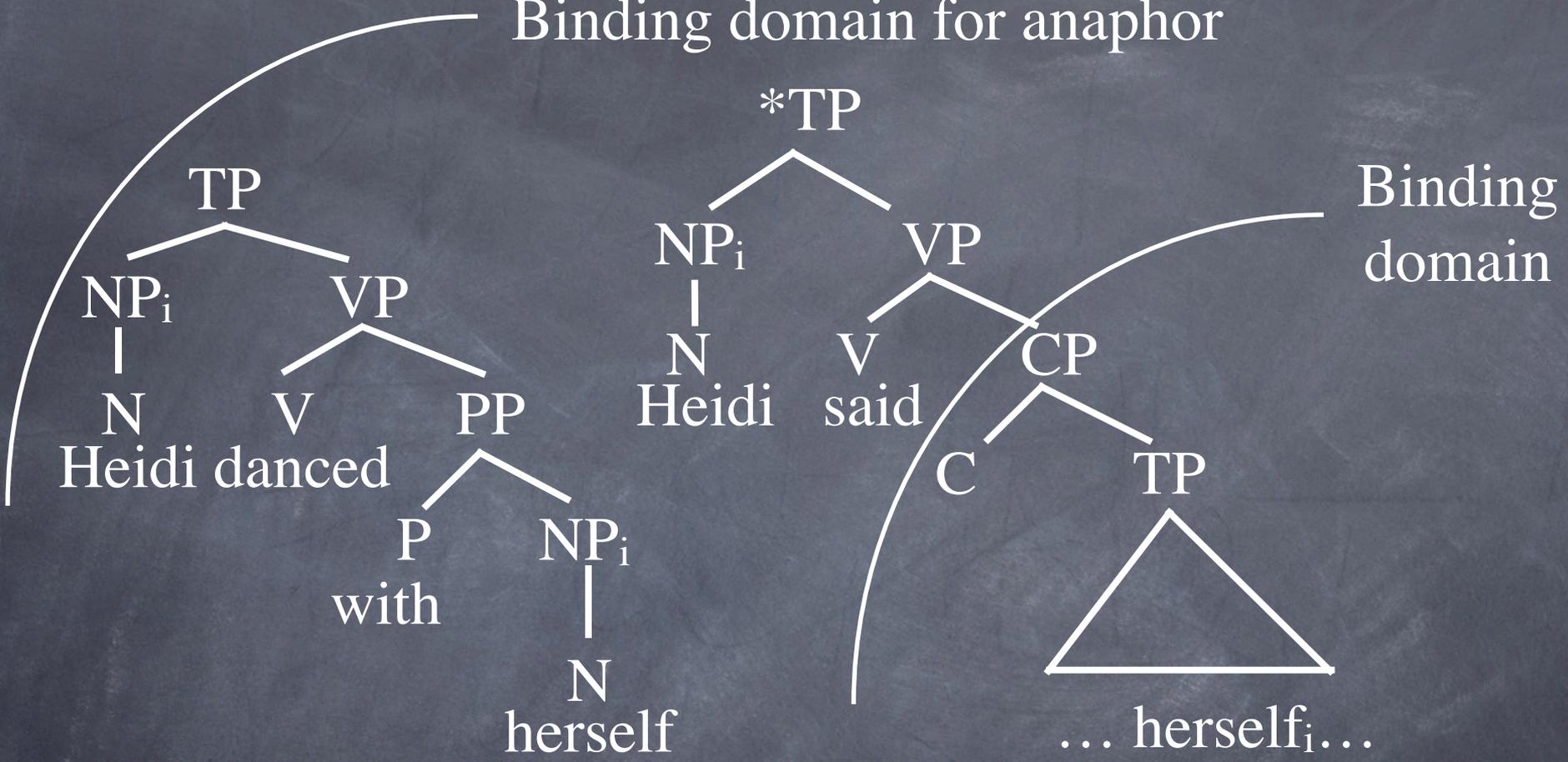
Binding domain

- **Binding domain:** The clause containing the anaphor
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- **Binding Principle A:** An anaphor must be bound in its binding domain.

Binding domain for anaphor

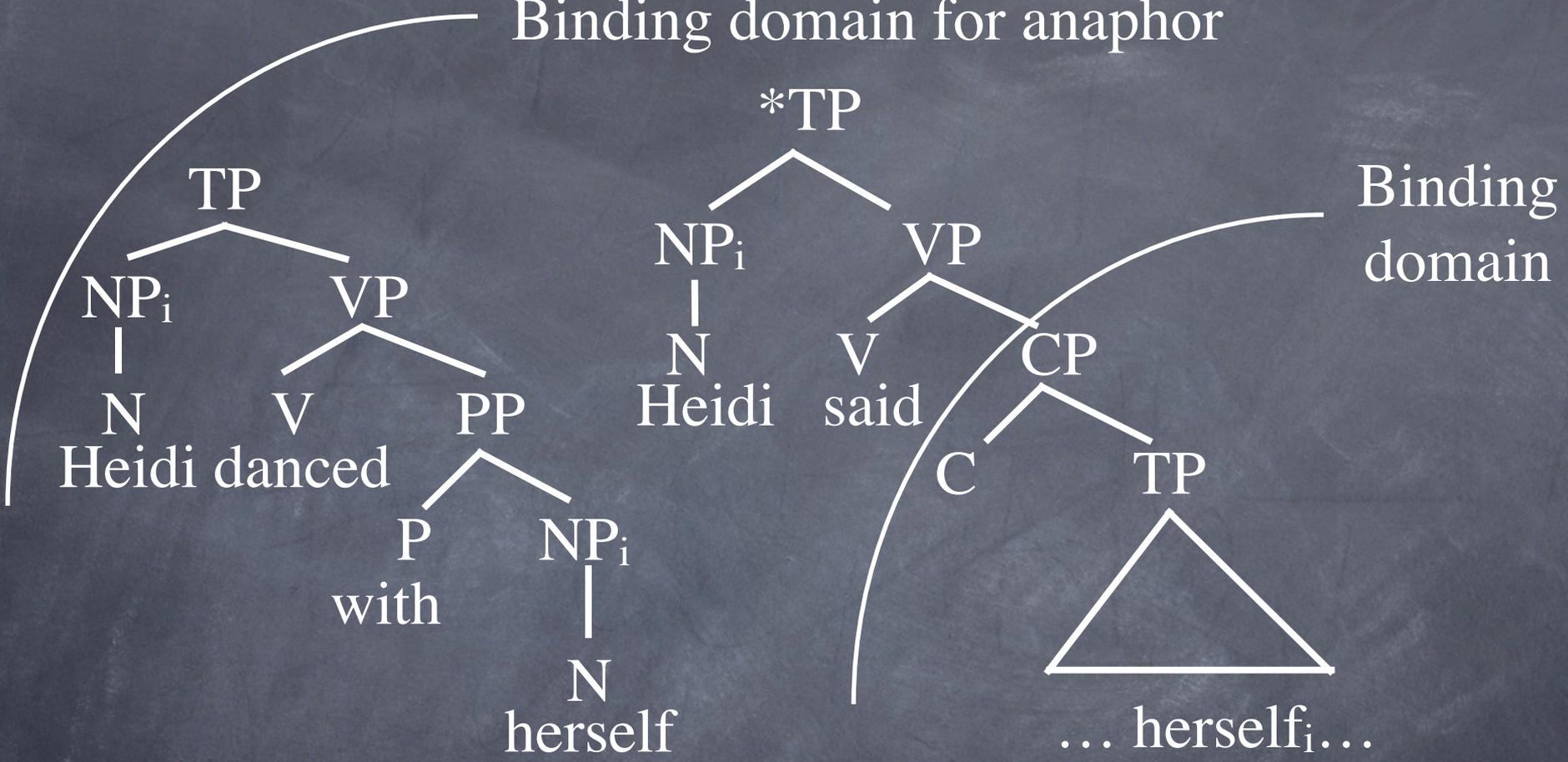


Binding domain for anaphor



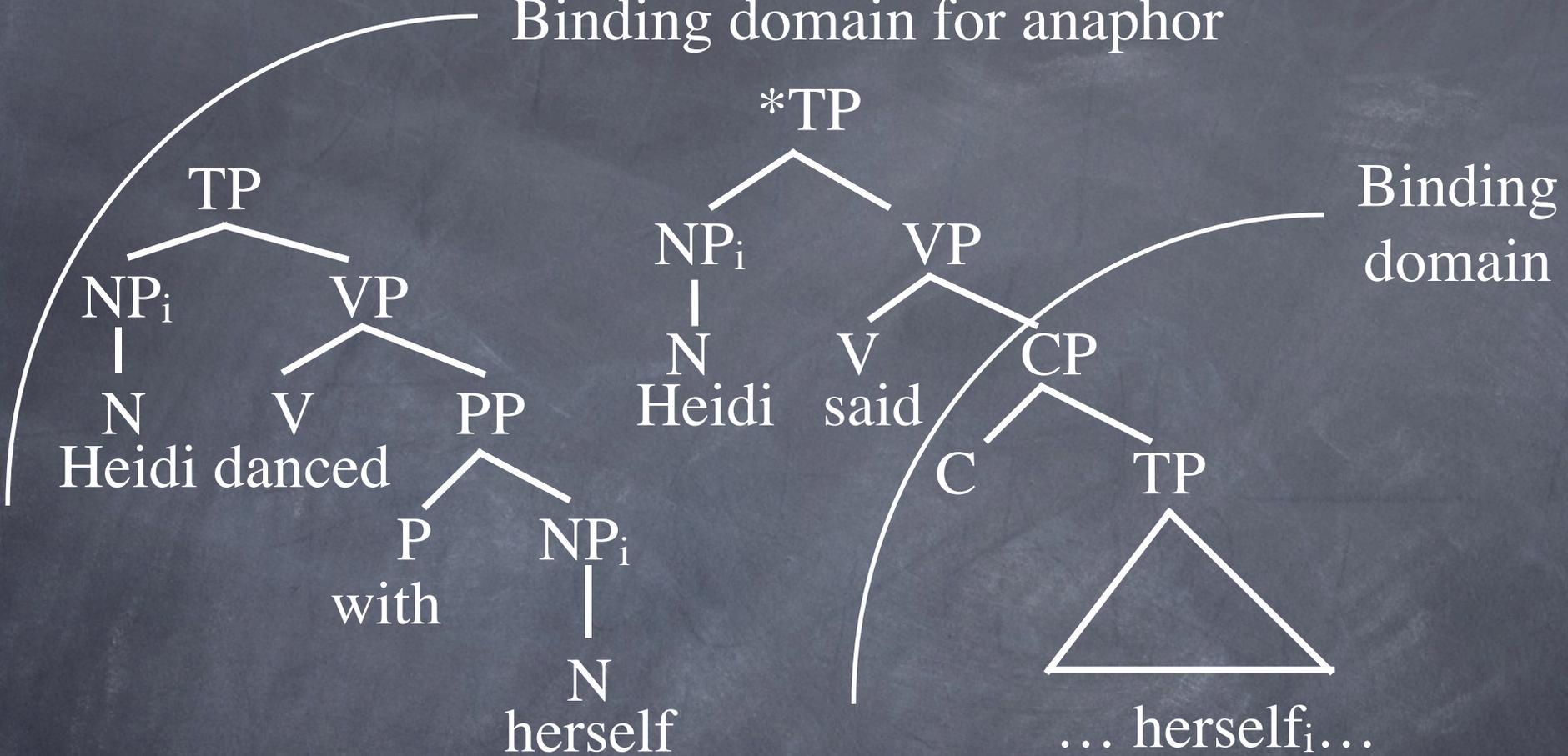
Coindexed?

Binding domain for anaphor



Coindexed? **yes**

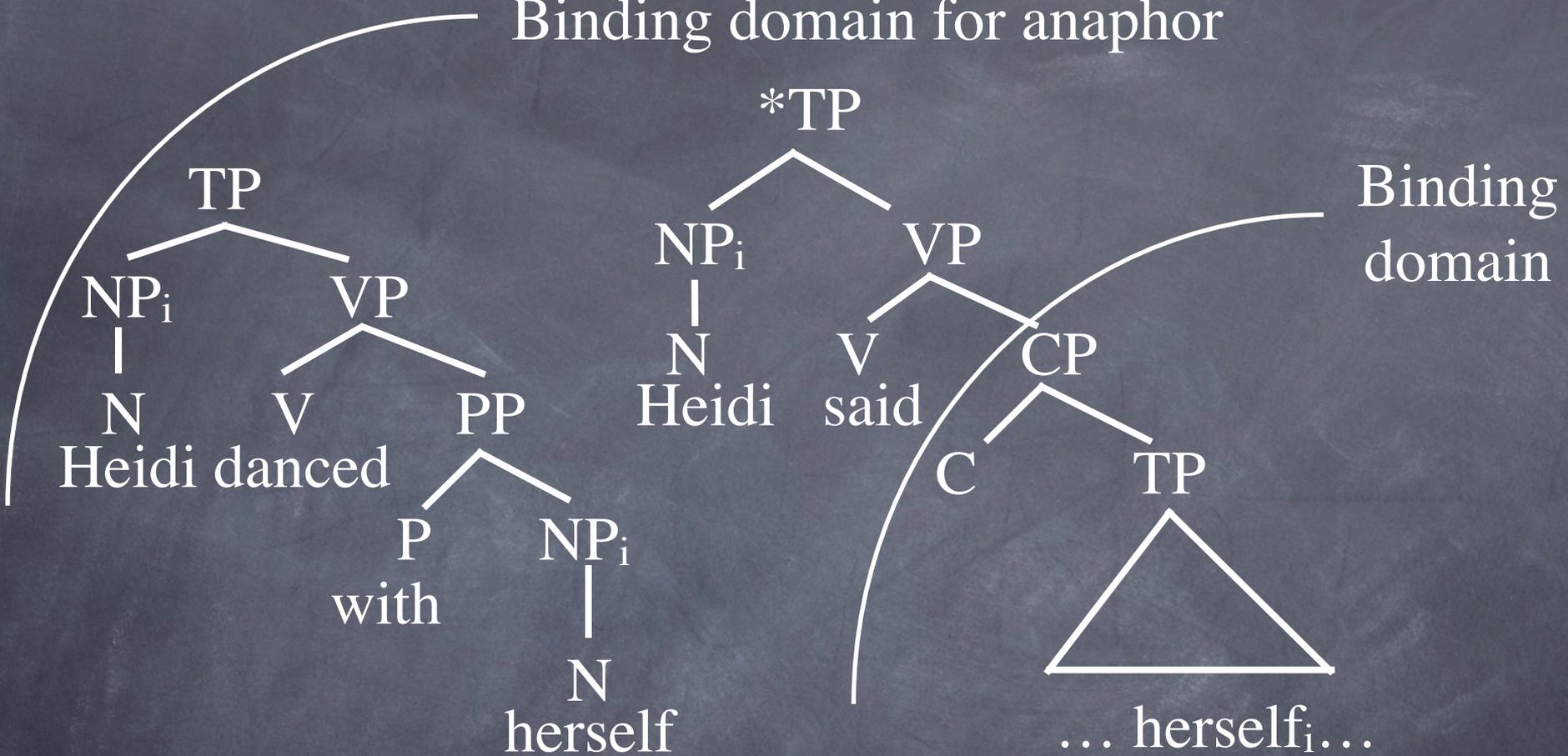
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Coindexed? **yes**

C-command?

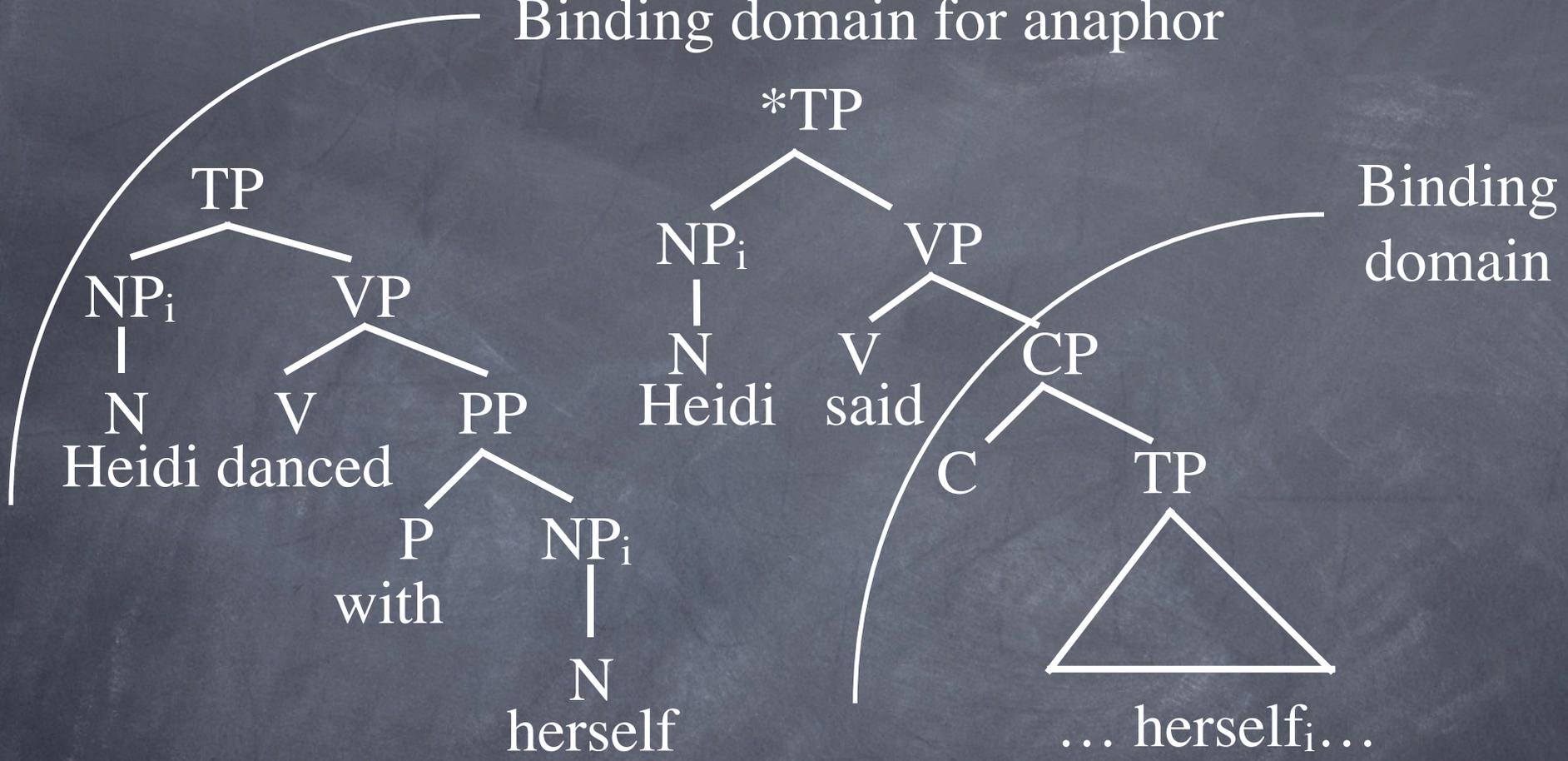
Binding domain for anaphor



Coindexed? **yes**

C-command? **yes ∴ Bound**

Binding domain for anaphor

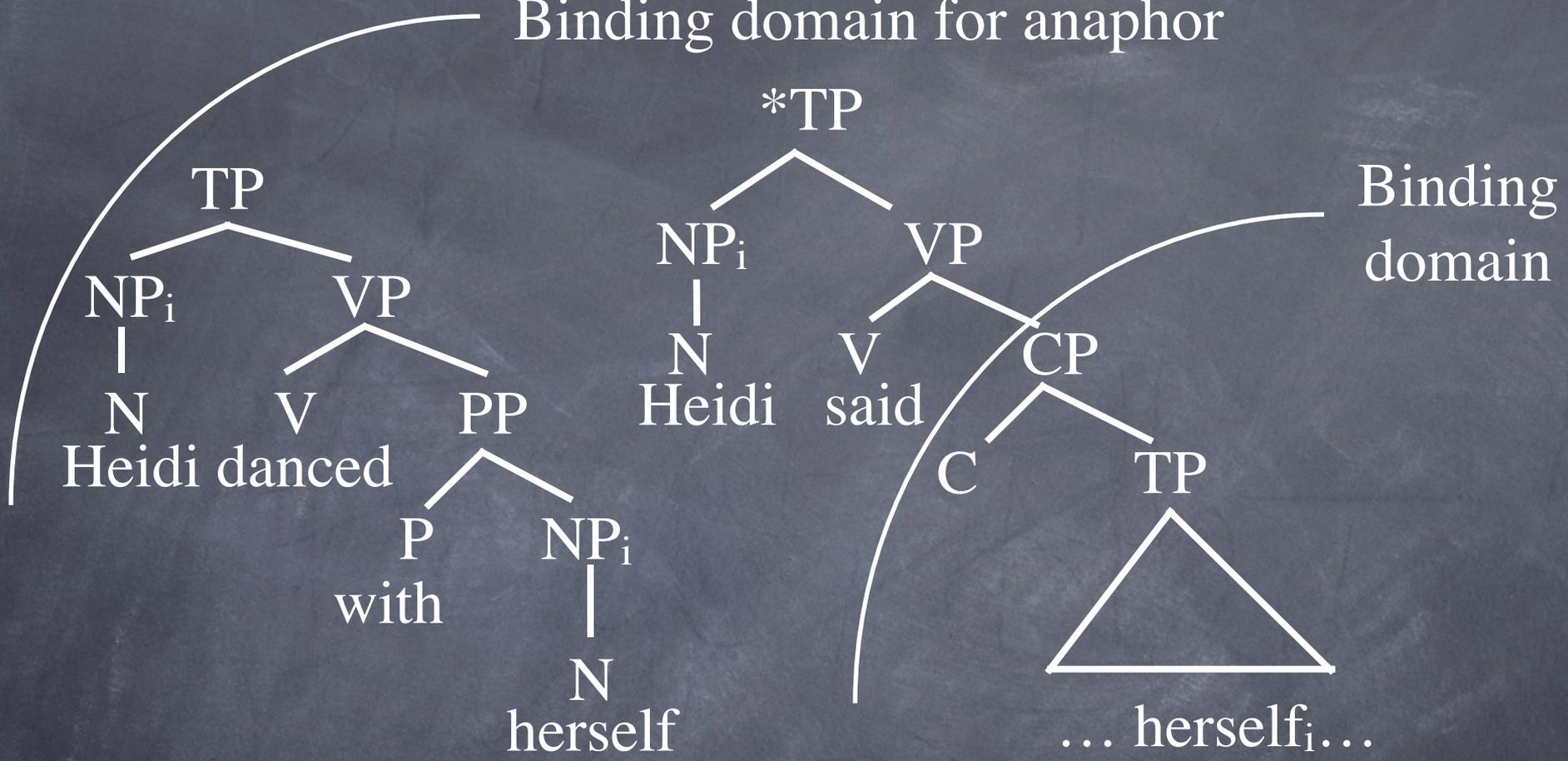


Coindexed? **yes**

C-command? **yes ∴ Bound**

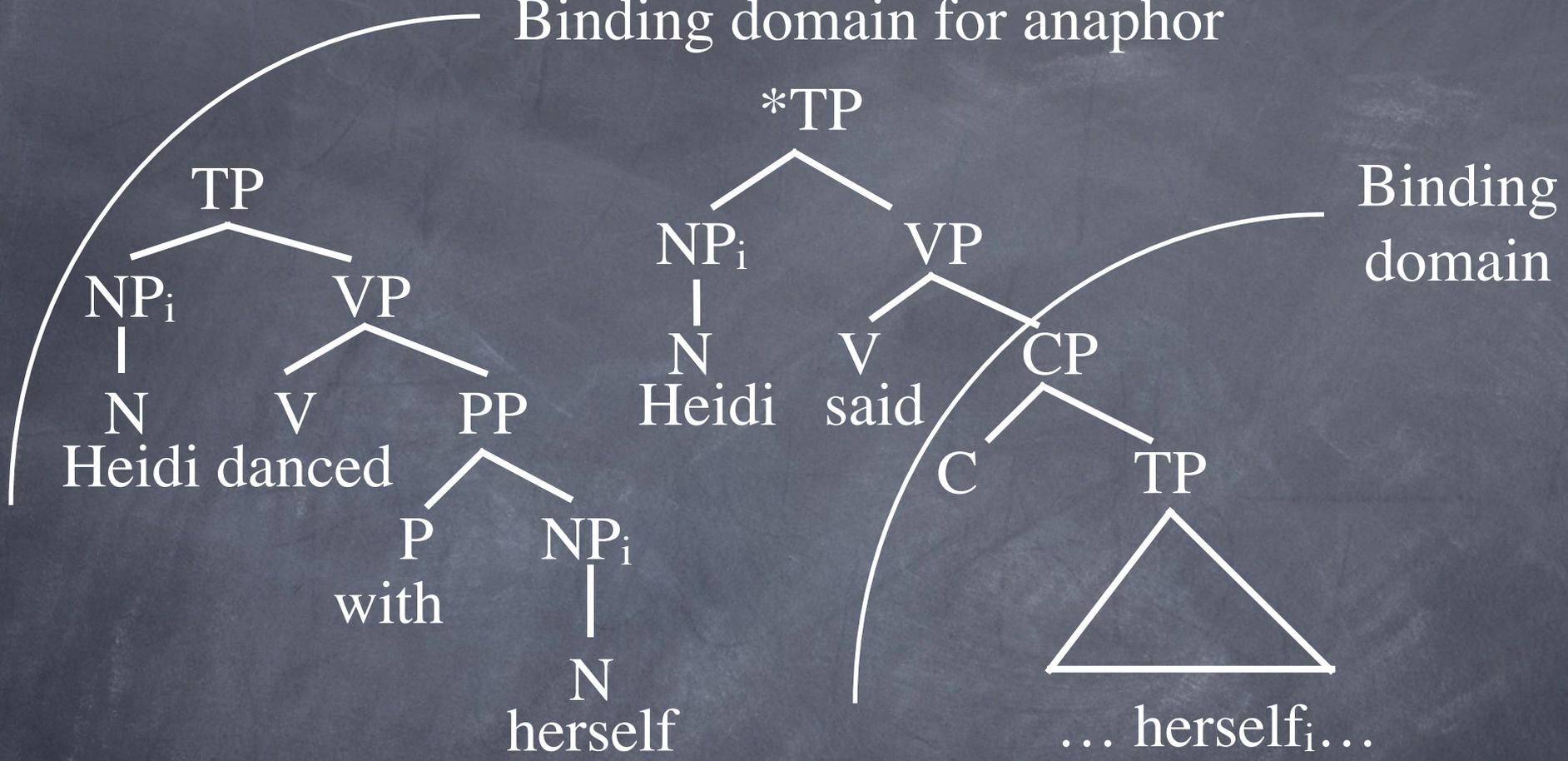
Bound in domain?

Binding domain for anaphor



- Coindexed? **yes**
- C-command? **yes** \therefore **Bound**
- Bound in domain? **yes**

Binding domain for anaphor



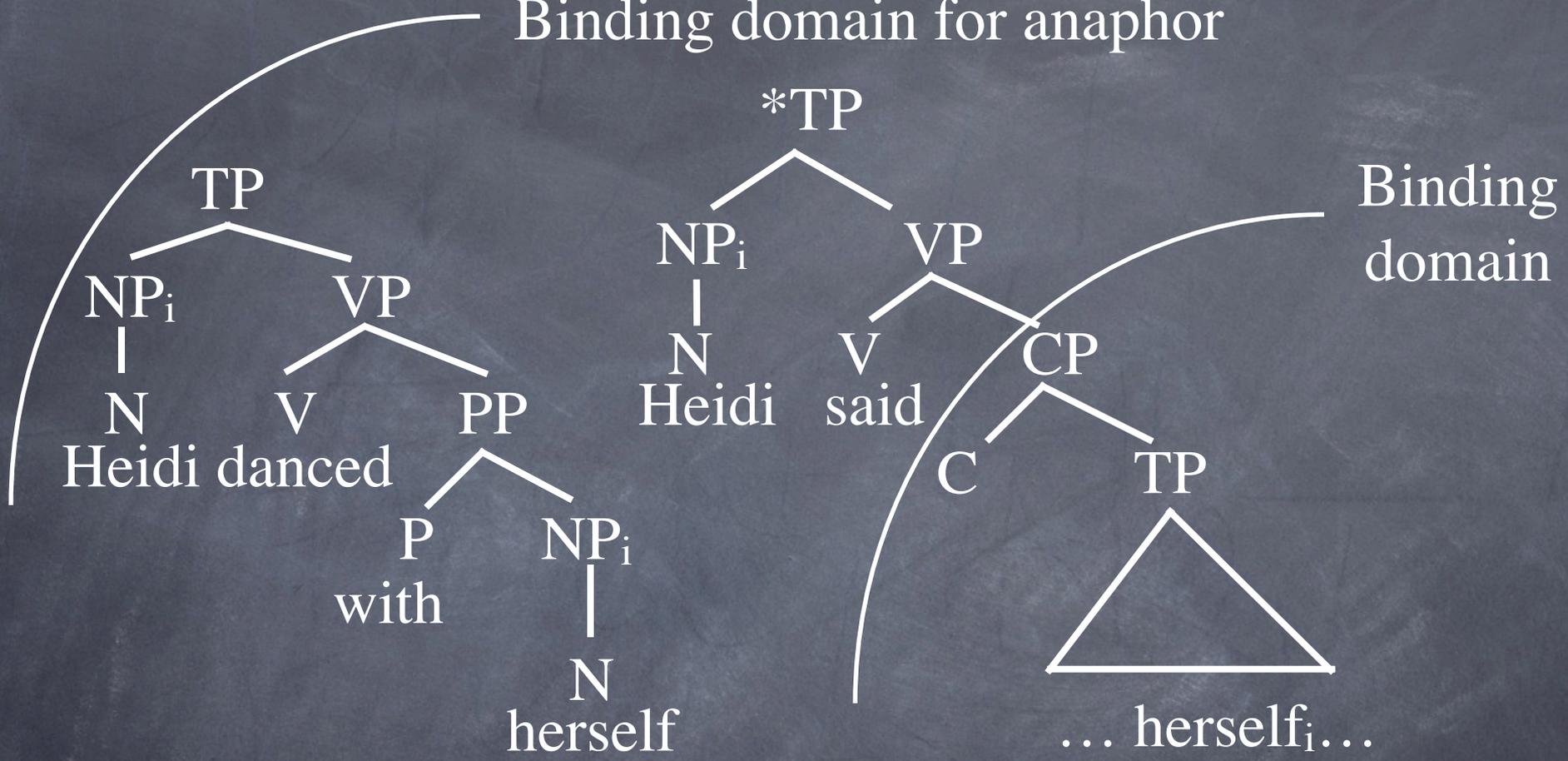
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Binding domain for anaphor



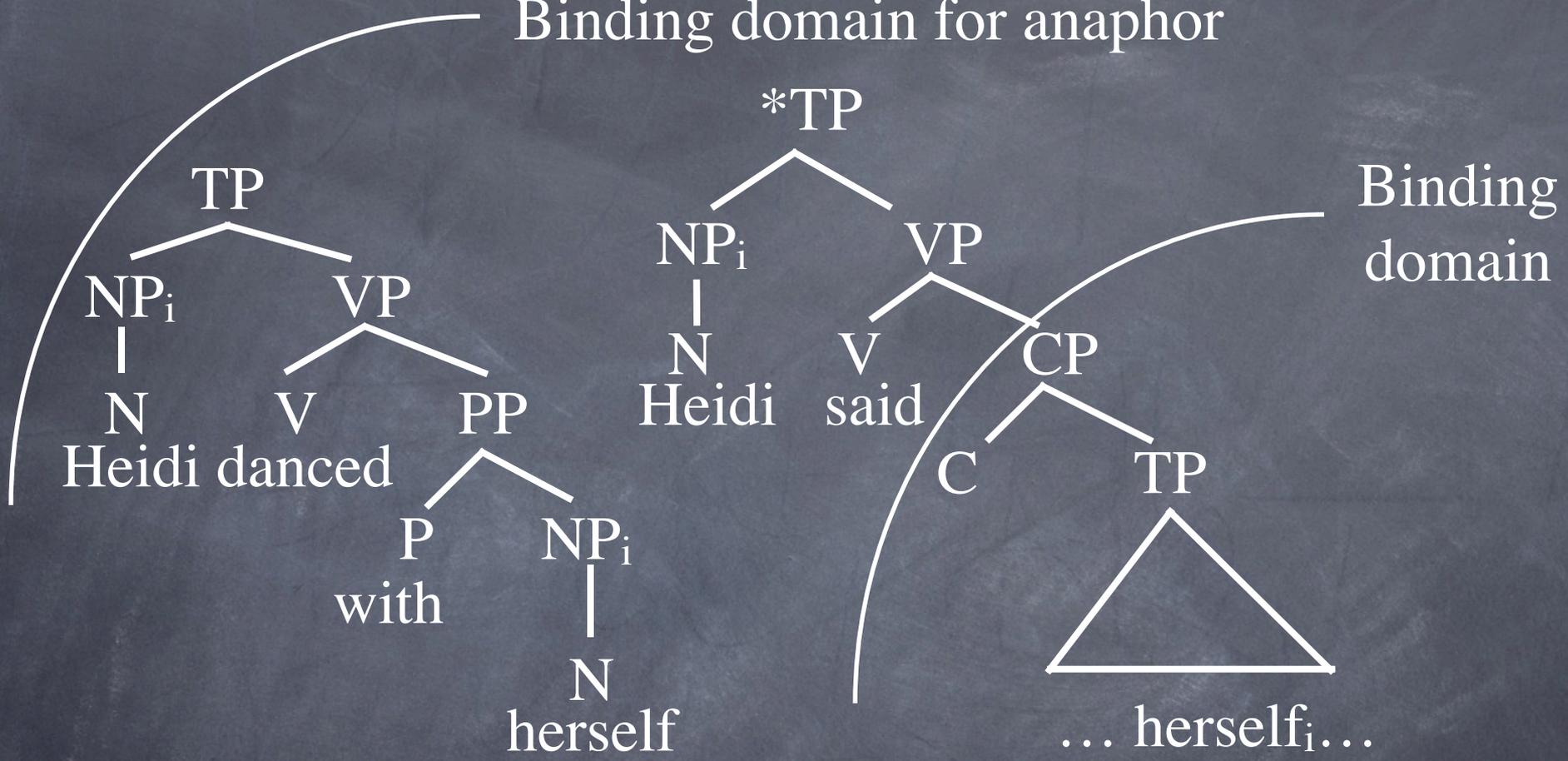
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Binding domain for anaphor



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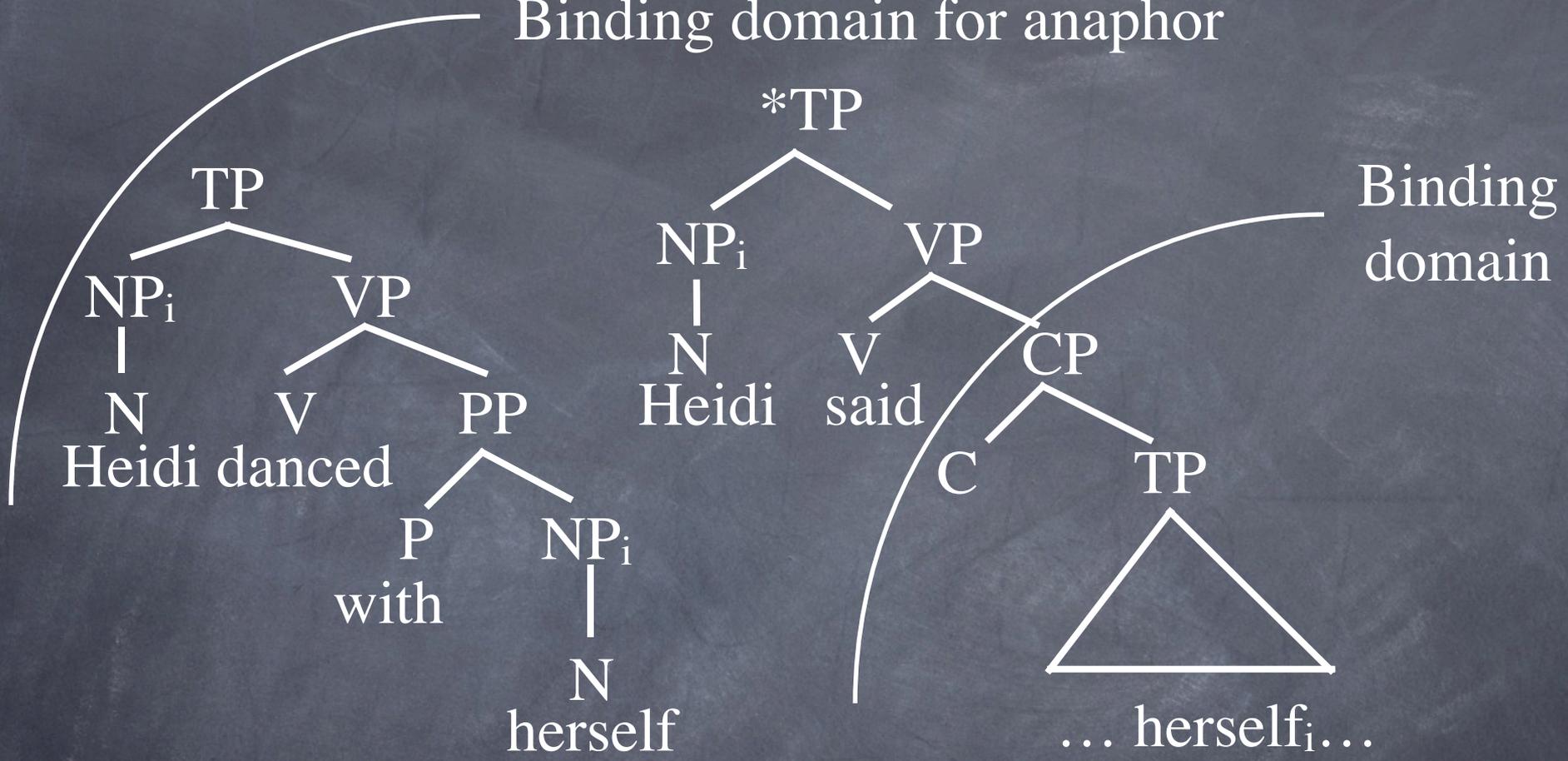
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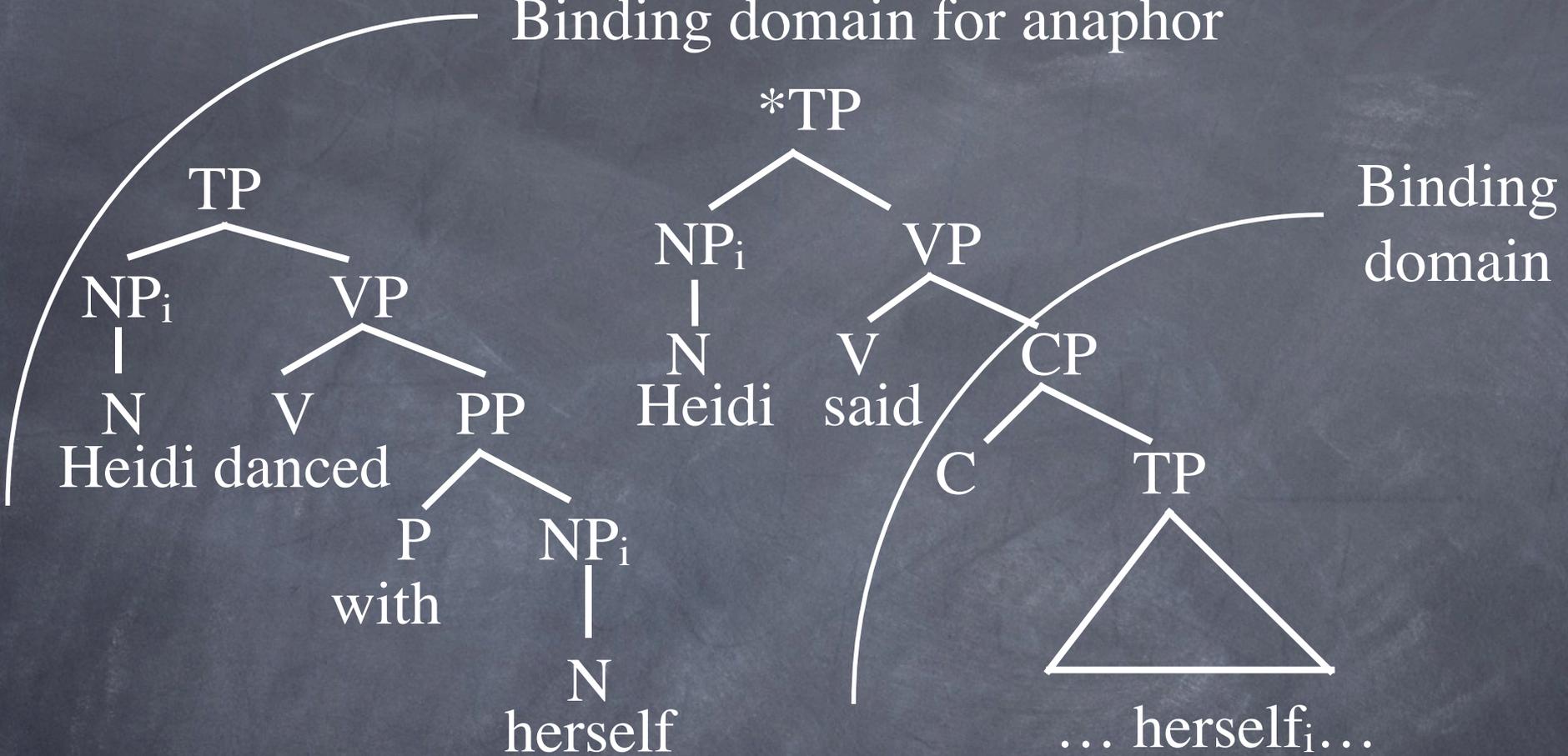
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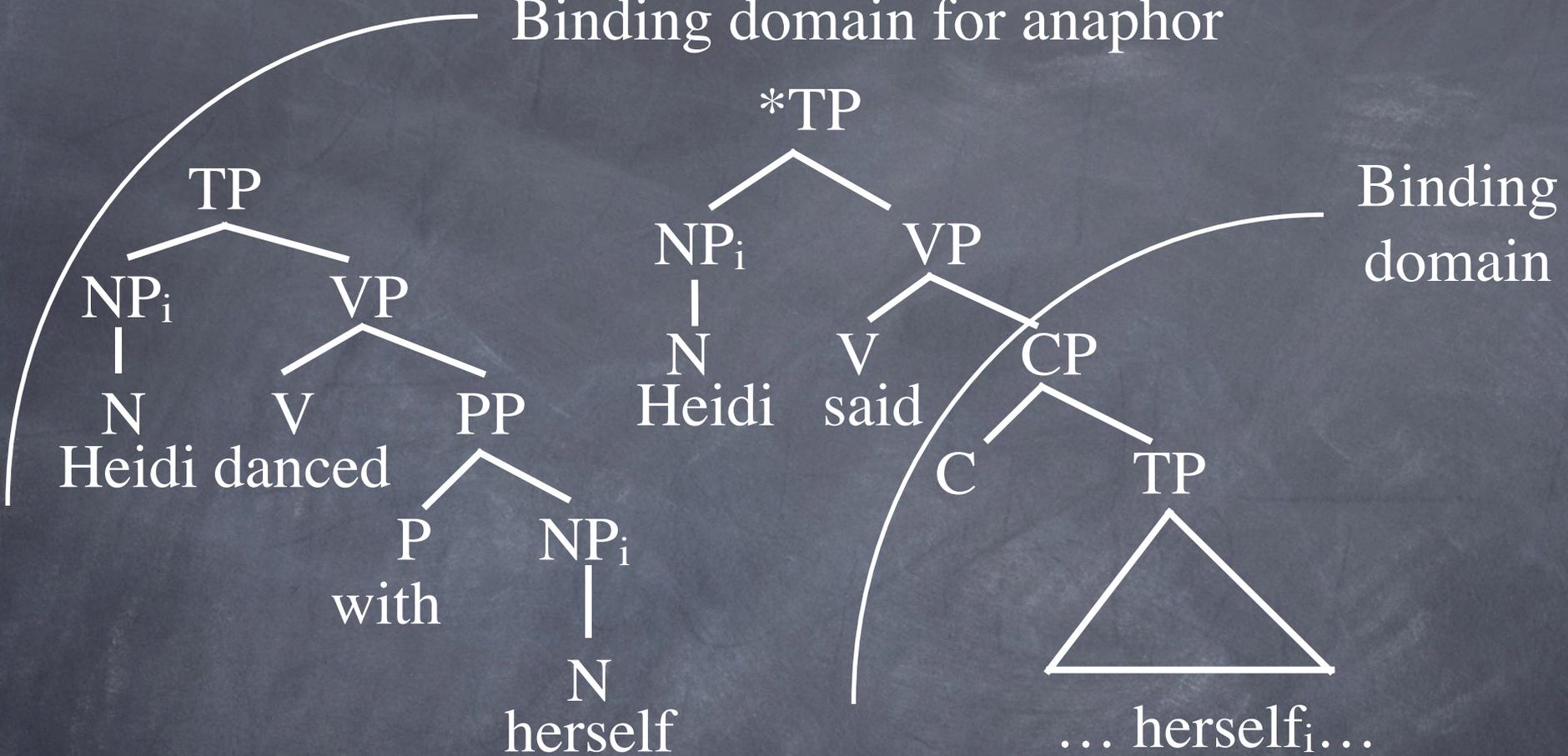
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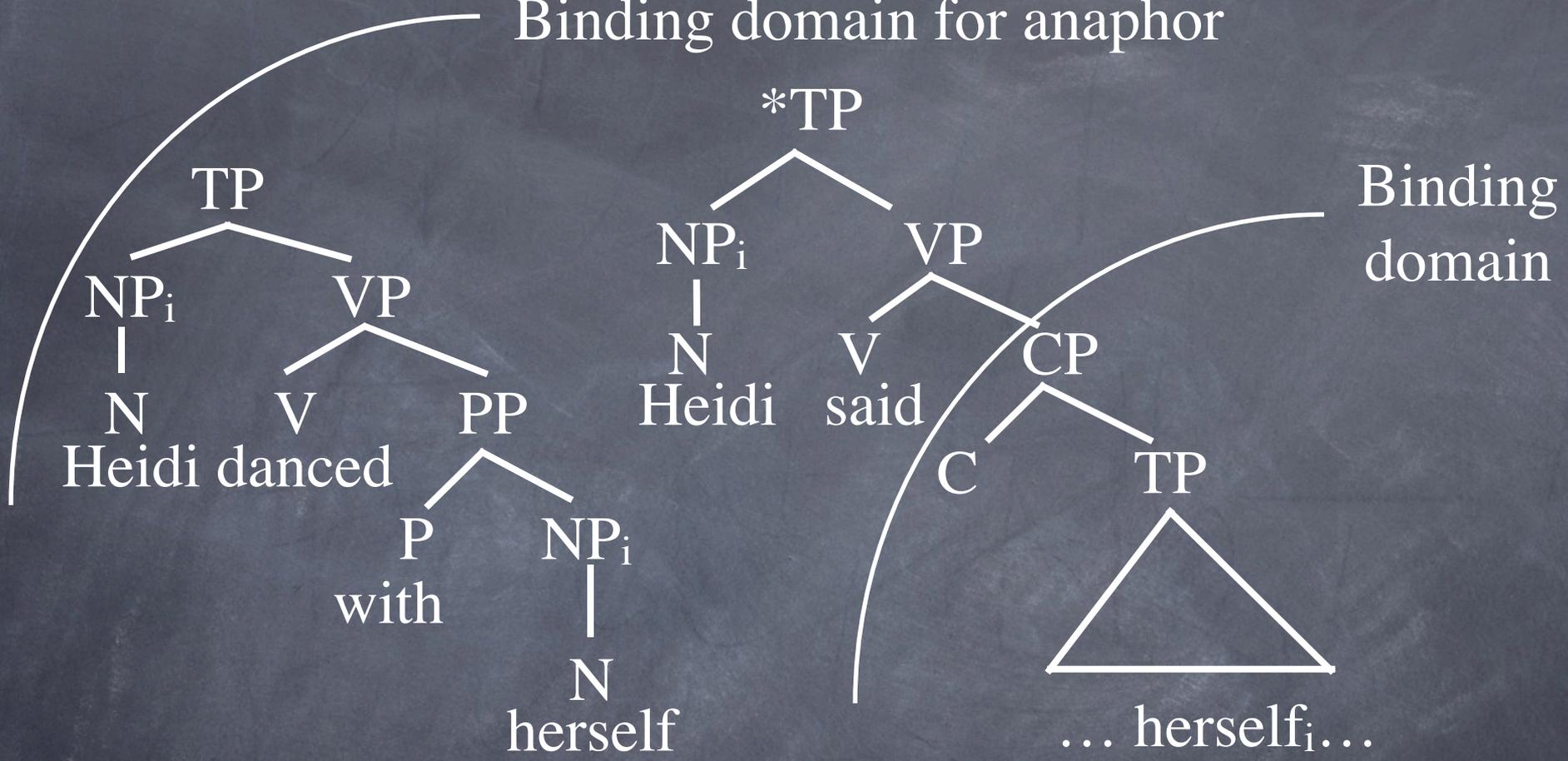
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 Bound in domain? **no**

VIOLATES PRINCIPLE A

A (more) intuitive characterization???

● Principle A imposes TWO restrictions:

1) The anaphor must be bound

= both c-commanded and coindexed

2) AND The anaphor must be bound (find its antecedent)
within its own clause (the binding domain)

Note that the restriction is **not** that an anaphor needs to be simply bound. An anaphor can be bound, yet the sentence still ungrammatical if it isn't bound **locally**.

Pronouns

Pronouns

• Heidi_i bopped her_k on the head with the zucchini

Pronouns

- Heidi_i bopped her_k on the head with the zucchini
- *Heidi_i bopped her_i on the head with the zucchini

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- Heidi_i bopped her_k on the head with the zucchini
- *Heidi_i bopped her_i on the head with the zucchini
- Heidi_i said that she_i danced with Art

Pronouns

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- *Heidi_i bopped her_i on the head with the zucchini
- Heidi_i said that she_i danced with Art
- Heidi_i said that she_k danced with Art.

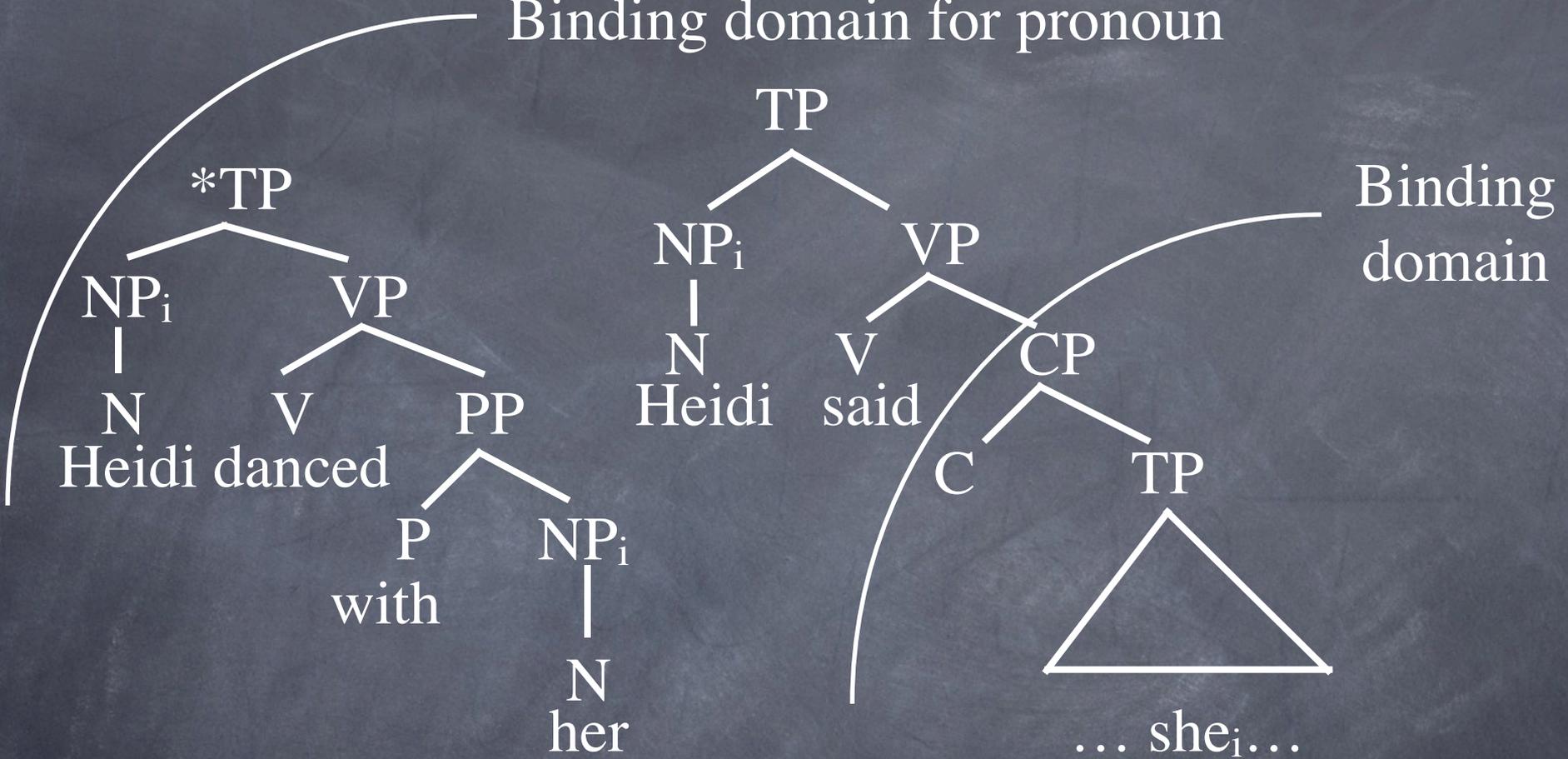
Pronouns

- Heidi_i bopped her_k on the head with the zucchini
- *Heidi_i bopped her_i on the head with the zucchini
- Heidi_i said that she_i danced with Art
- Heidi_i said that she_k danced with Art.
- Only restriction on pronouns: they **cannot** be bound within their clause

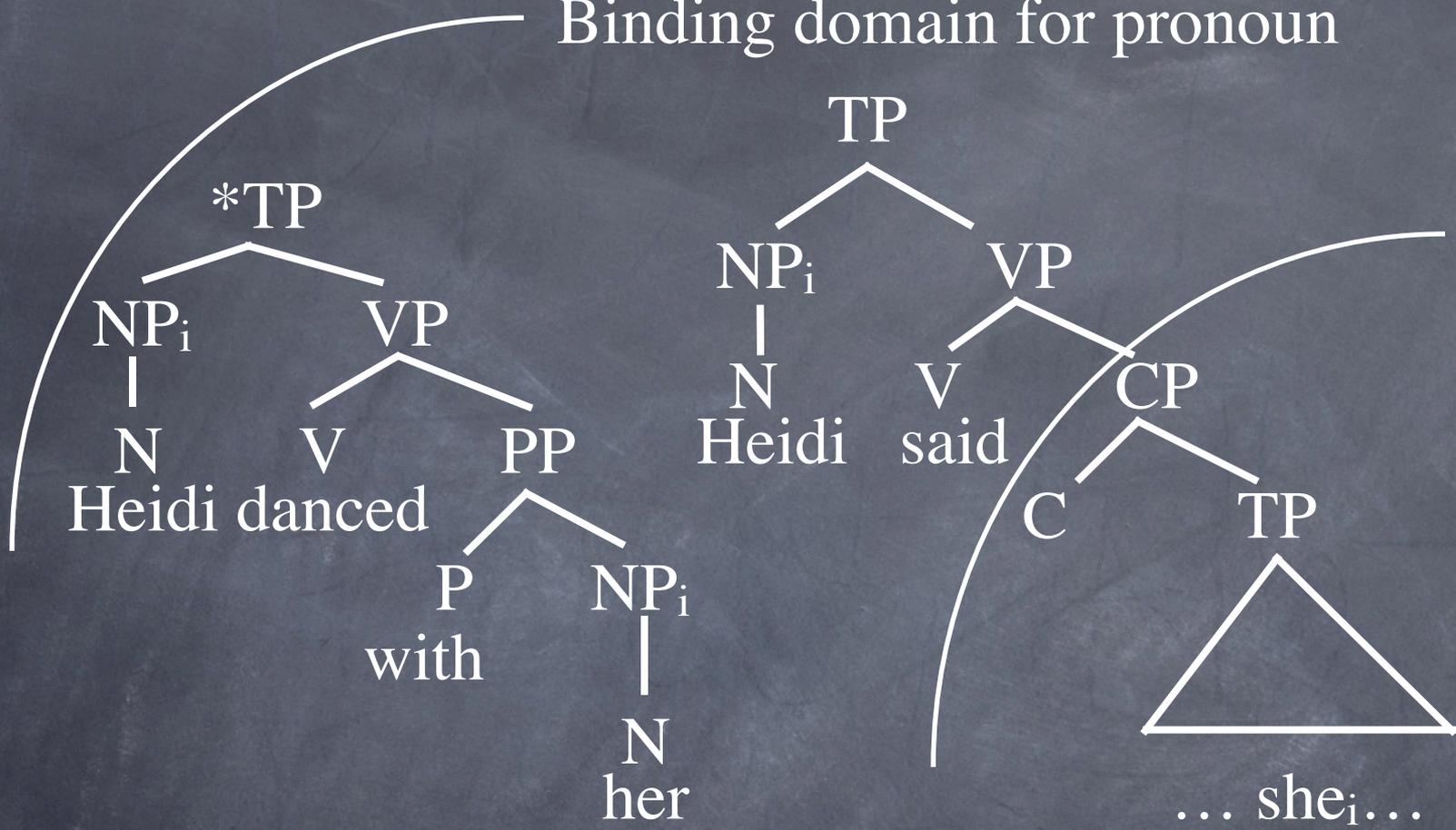
Pronouns

- **Free:** Not bound
- **Principle B:** Pronouns must be free in their Binding Domain.

Binding domain for pronoun



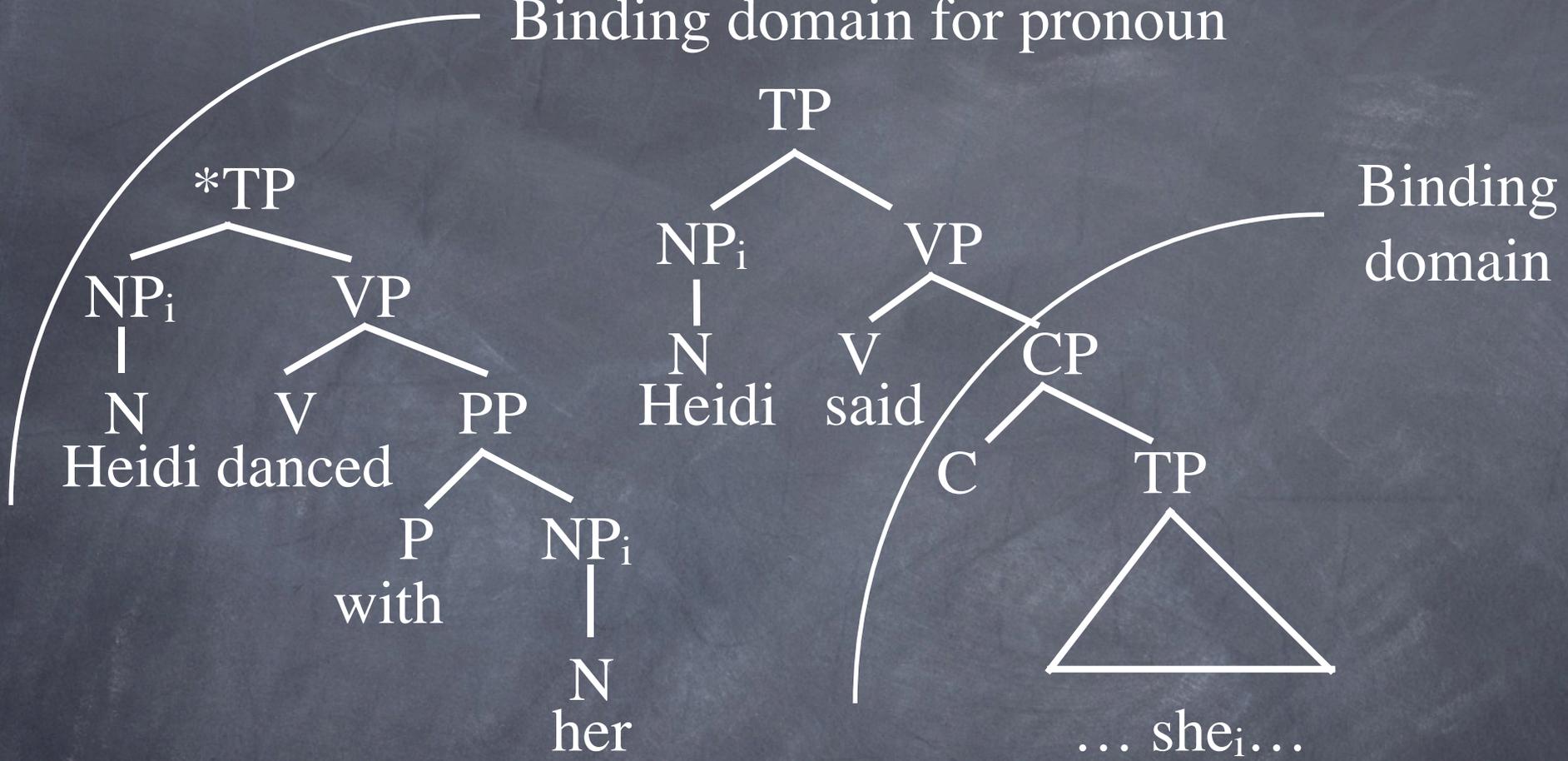
Binding domain for pronoun



Binding domain

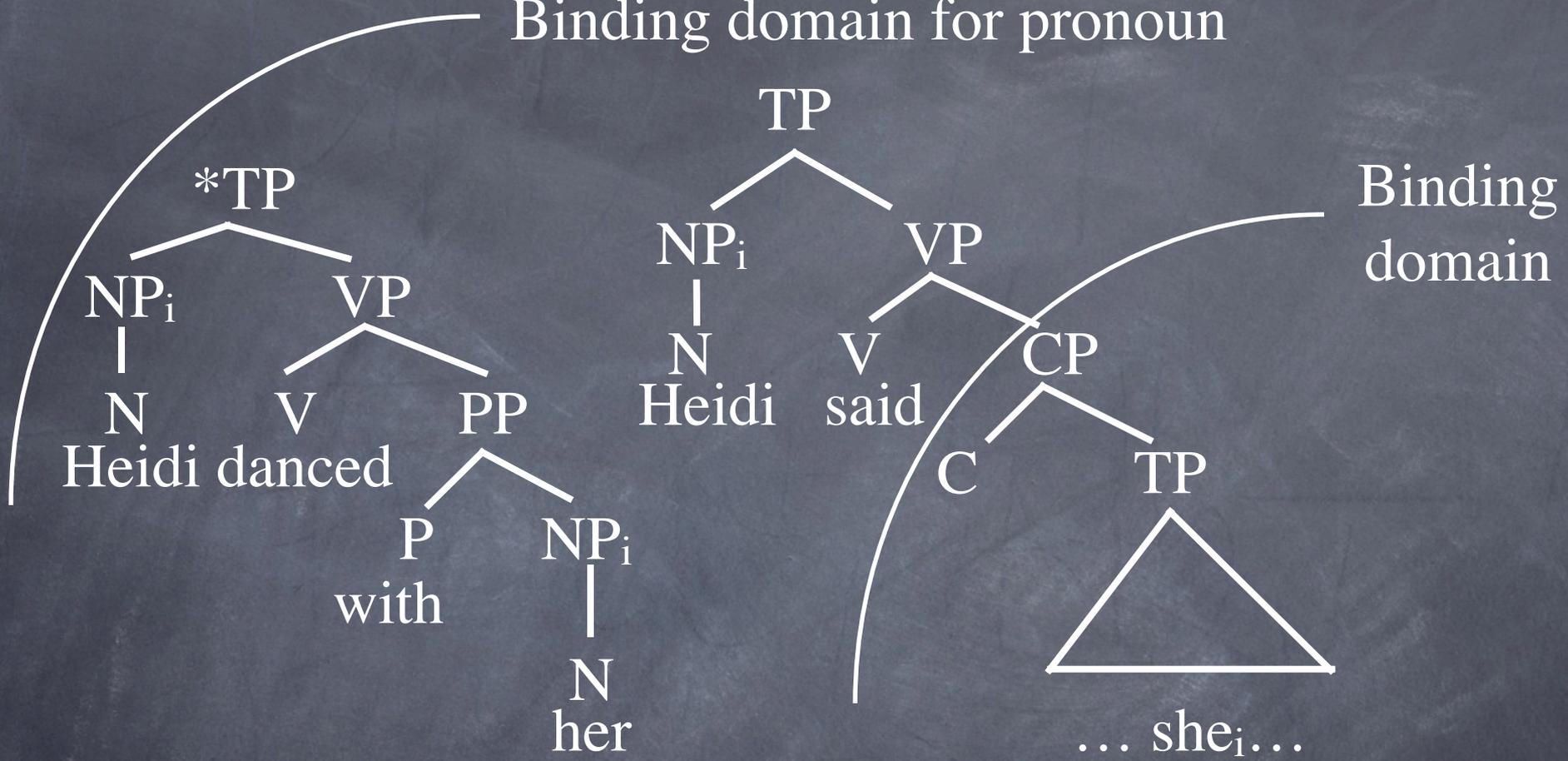
Coindexed?

Binding domain for pronoun



Coindexed? **yes**

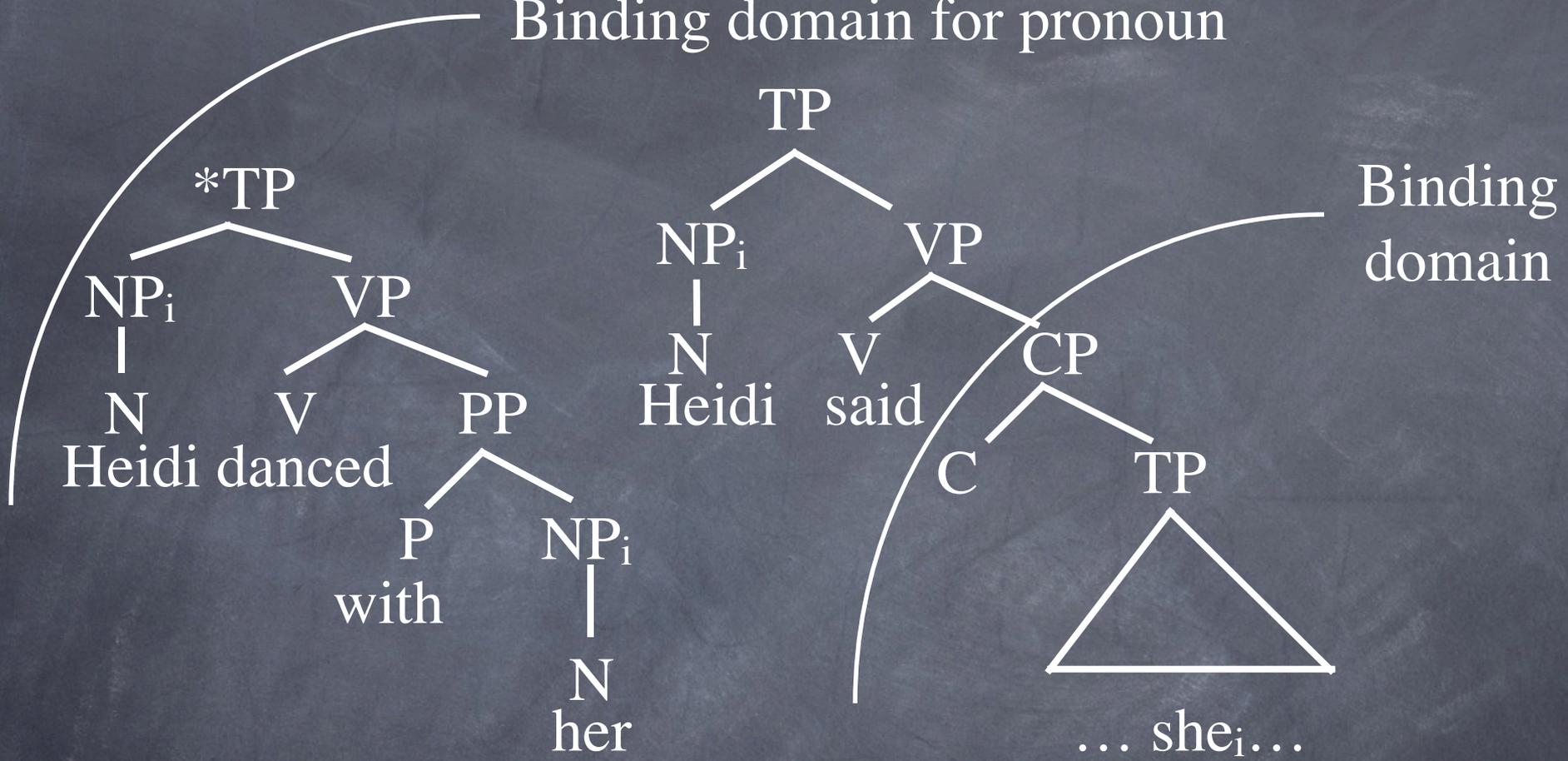
Binding domain for pronoun



Coindexed? **yes**

C-command?

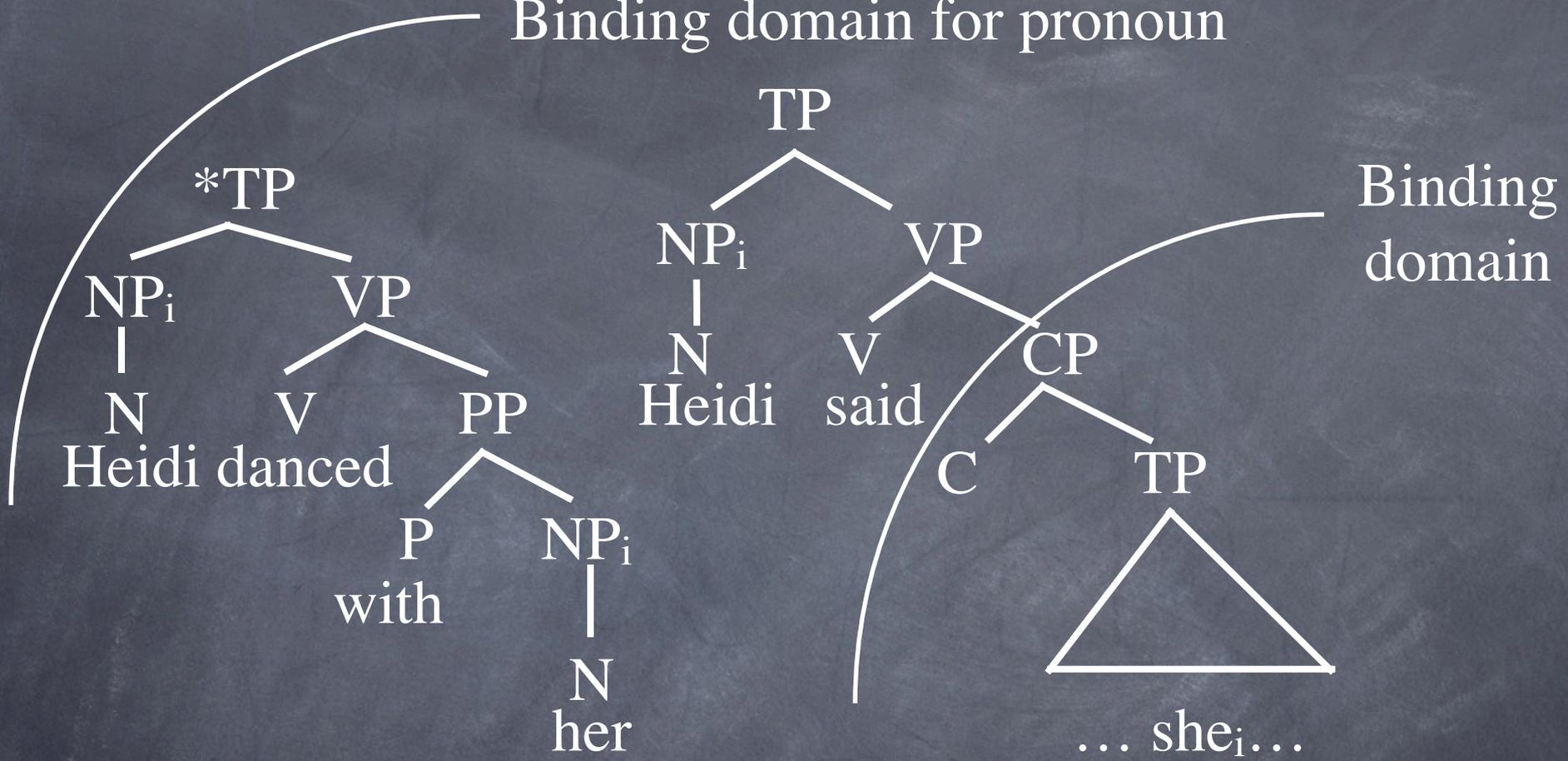
Binding domain for pronoun



Coindexed? **yes**

C-command? **yes ∴ Bound**

Binding domain for pronoun

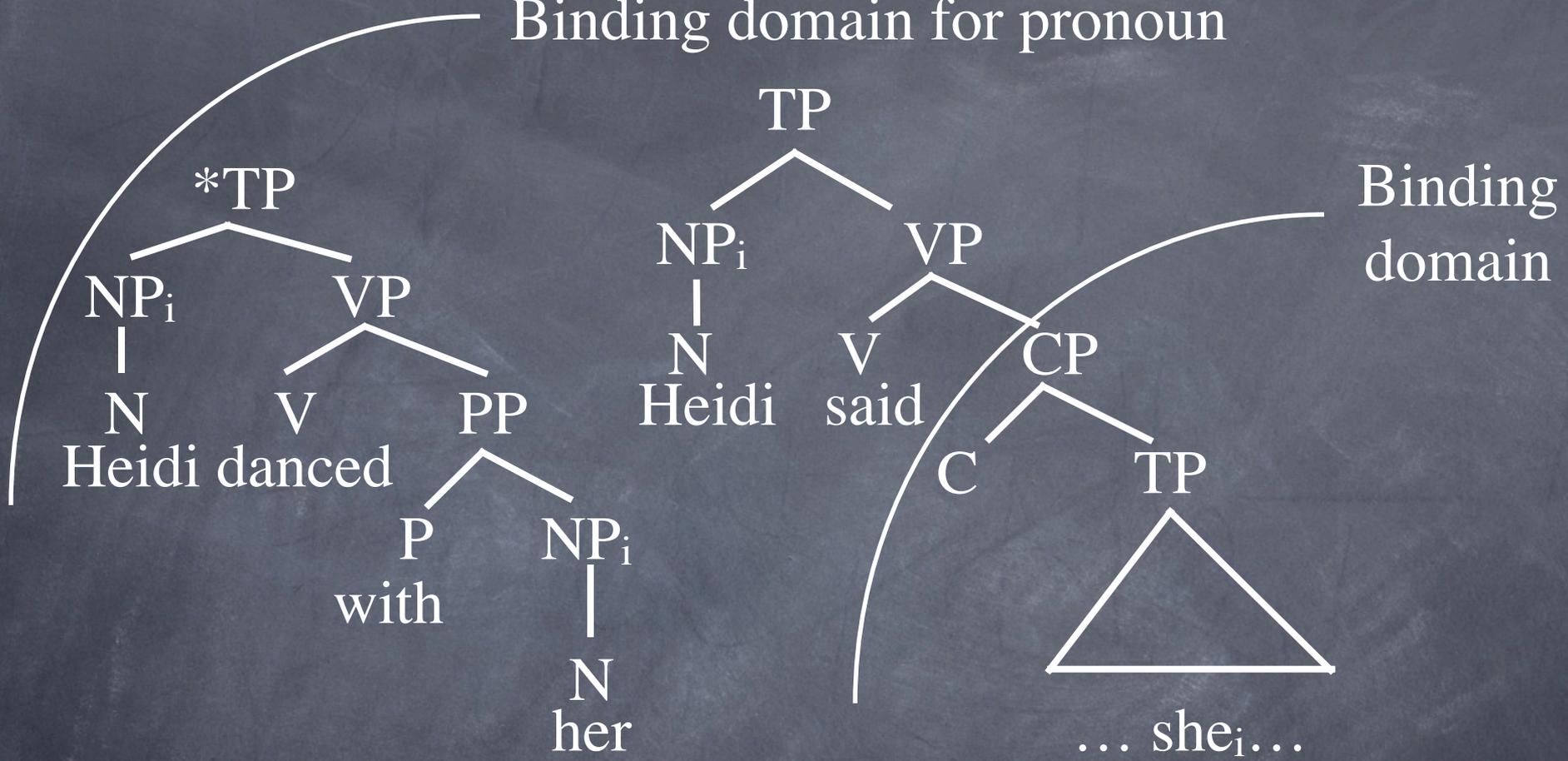


Coindexed? **yes**

C-command? **yes ∴ Bound**

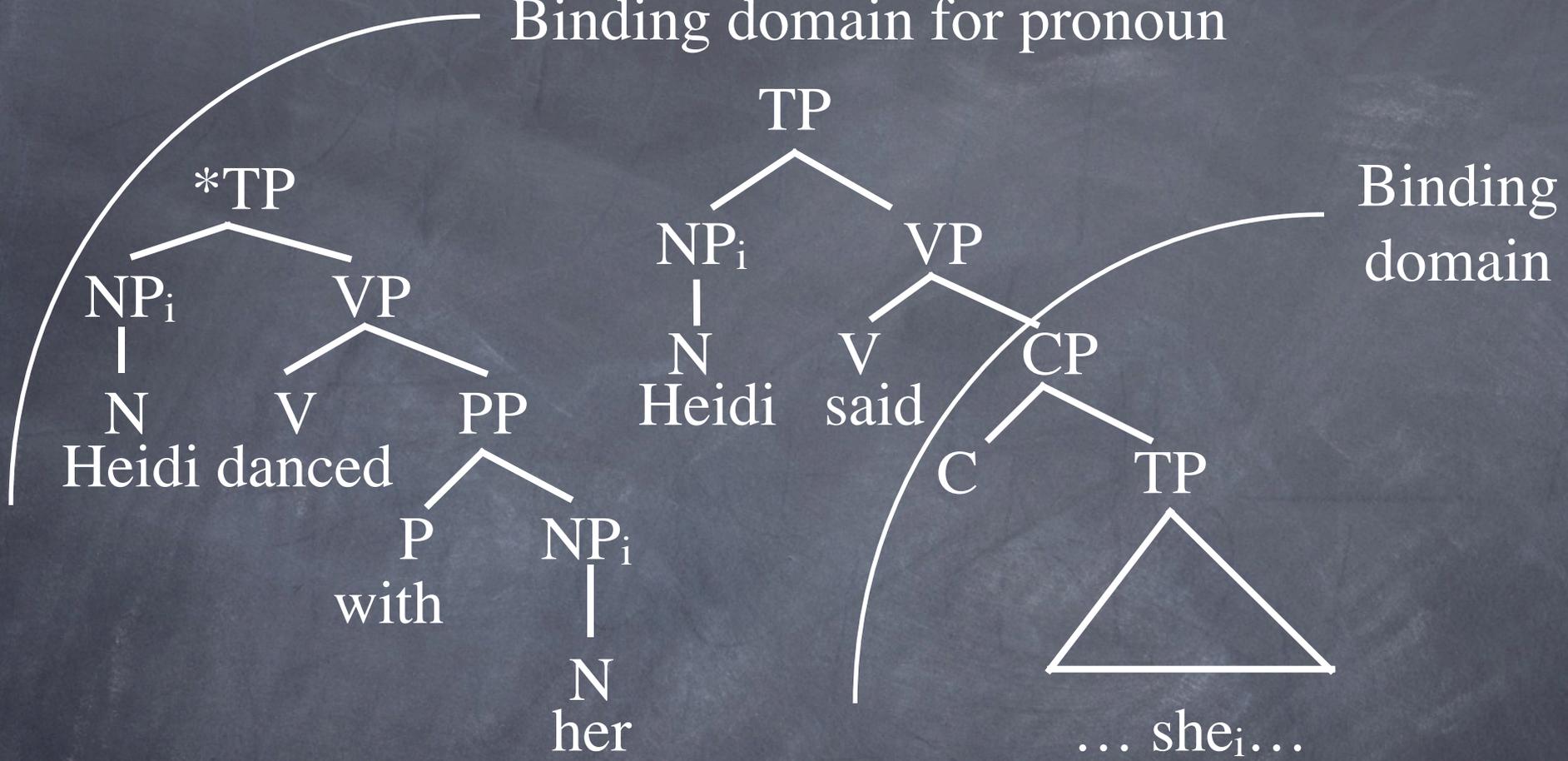
Free in domain?

Binding domain for pronoun



- Coindexed? **yes**
- C-command? **yes ∴ Bound**
- Free in domain? **no**

Binding domain for pronoun



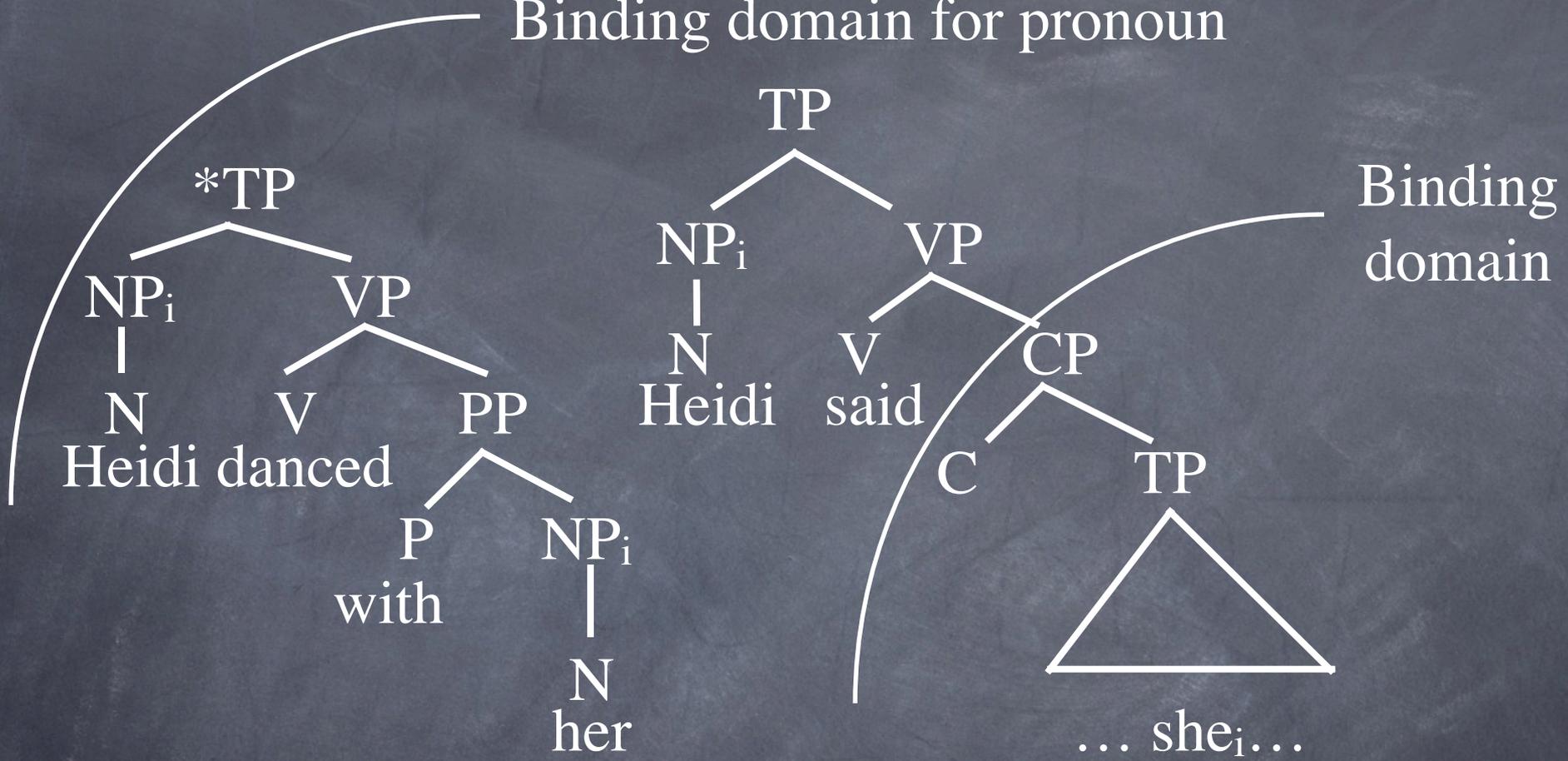
Coindexed? **yes**

C-command? **yes ∴ Bound**

Free in domain? **no**

VIOLATES PRINCIPLE B

Binding domain for pronoun



Coindexed? **yes**

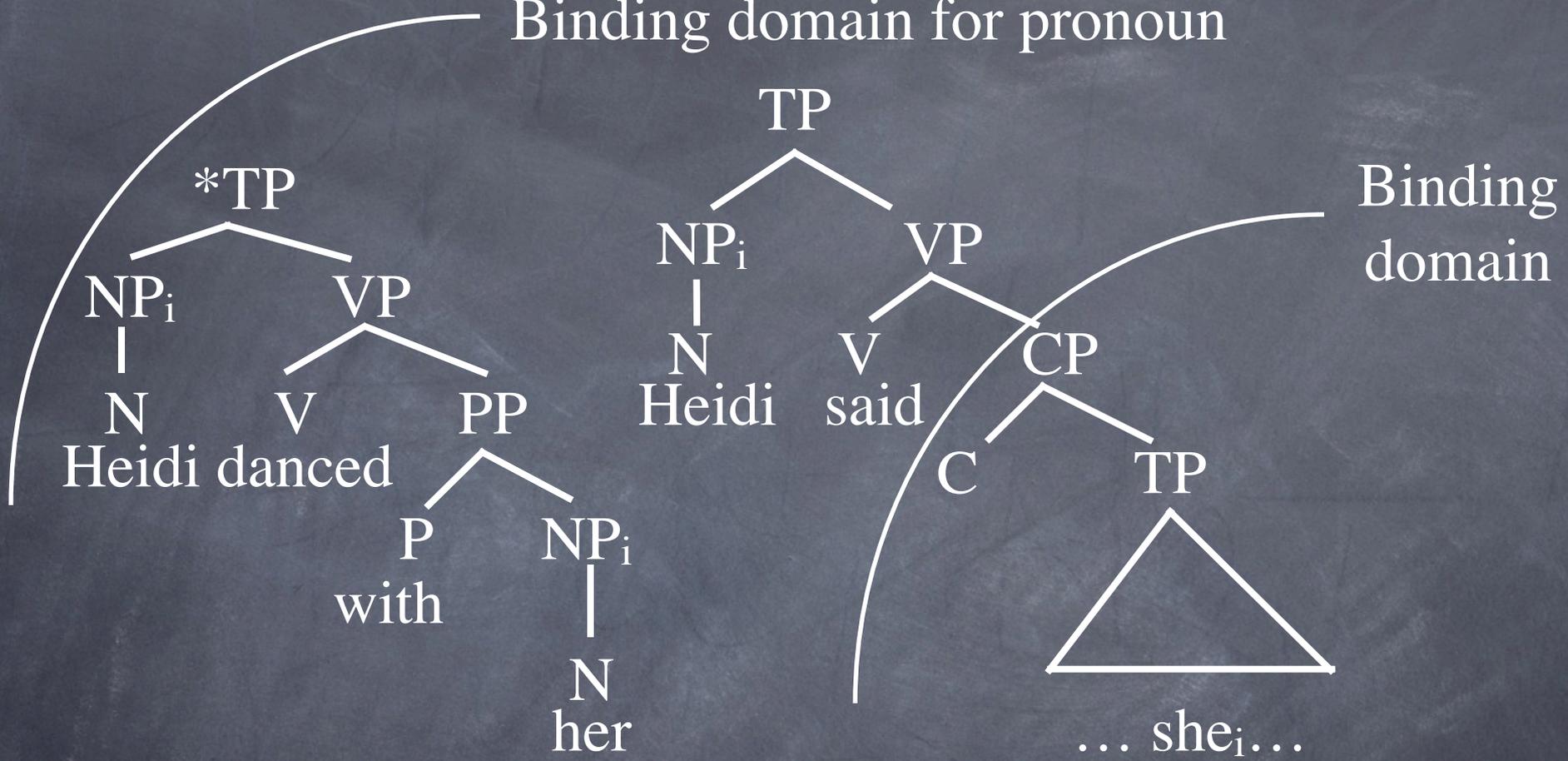
Coindexed?

C-command? **yes ∴ Bound**

Free in domain? **no**

VIOLATES PRINCIPLE B

Binding domain for pronoun



Coindexed? **yes**

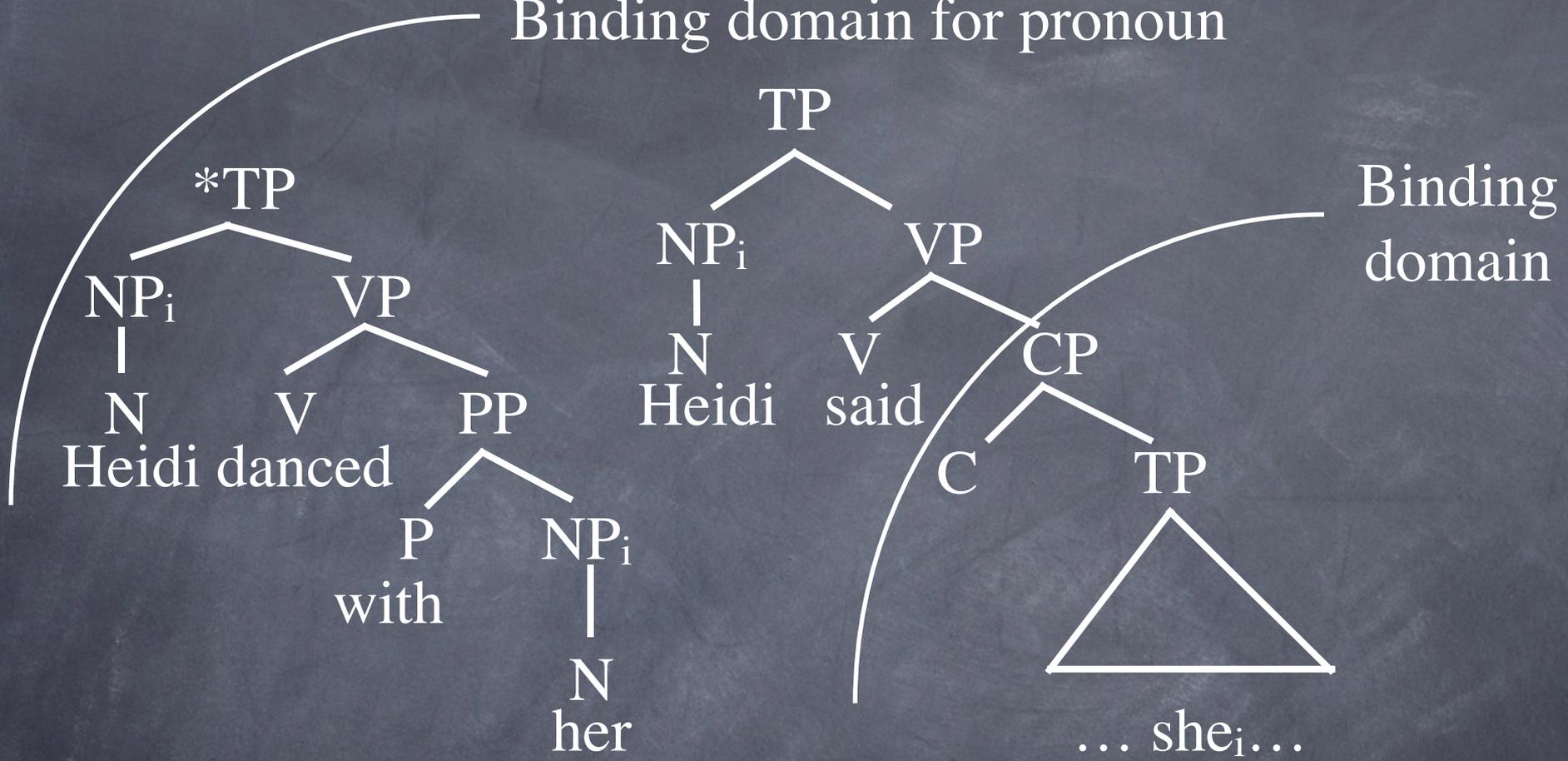
Coindexed? **yes**

C-command? **yes ∴ Bound**

Free in domain? **no**

VIOLATES PRINCIPLE B

Binding domain for pronoun



Coindexed? **yes**

Coindexed? **yes**

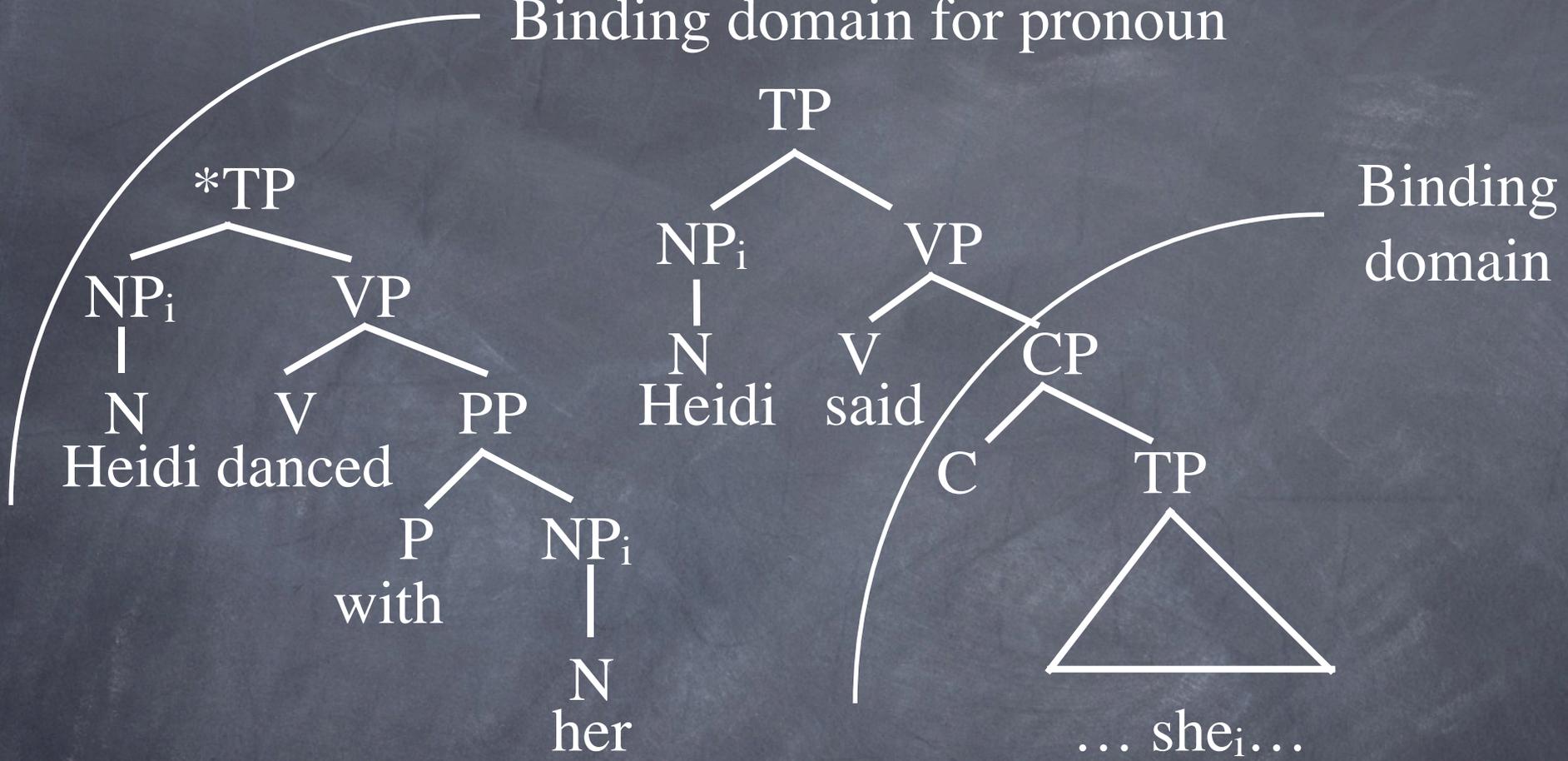
C-command? **yes ∴ Bound**

C-command?

Free in domain? **no**

VIOLATES PRINCIPLE B

Binding domain for pronoun



Coindexed? **yes**

C-command? **yes ∴ Bound**

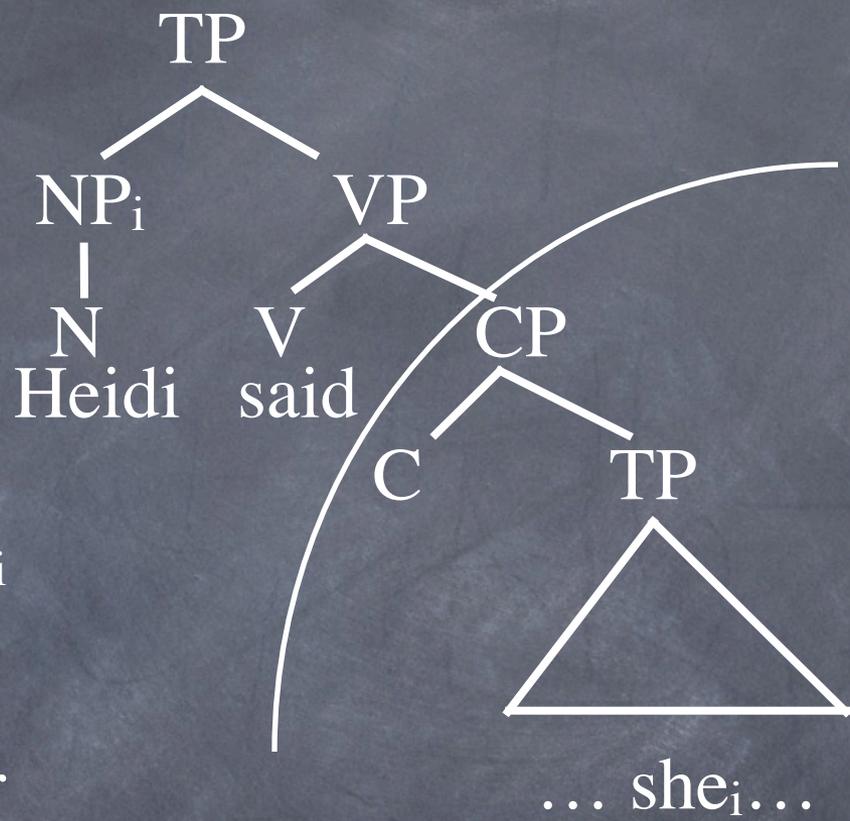
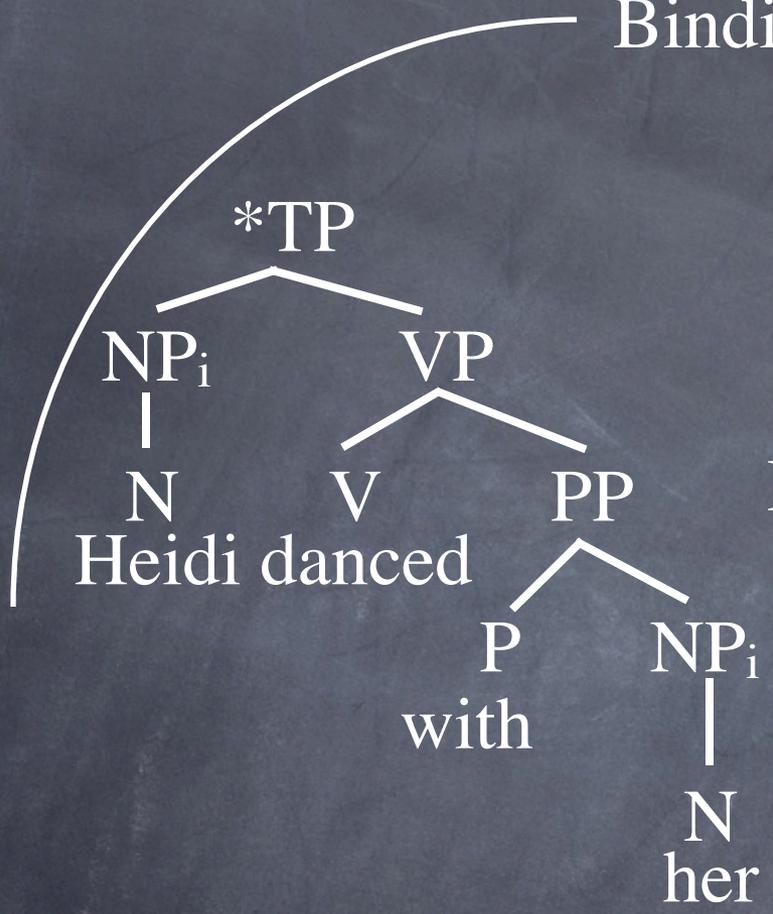
Free in domain? **no**

VIOLATES PRINCIPLE B

Coindexed? **yes**

C-command? **yes ∴ Bound**

Binding domain for pronoun



Binding domain

Coindexed? **yes**

C-command? **yes ∴ Bound**

Free in domain? **no**

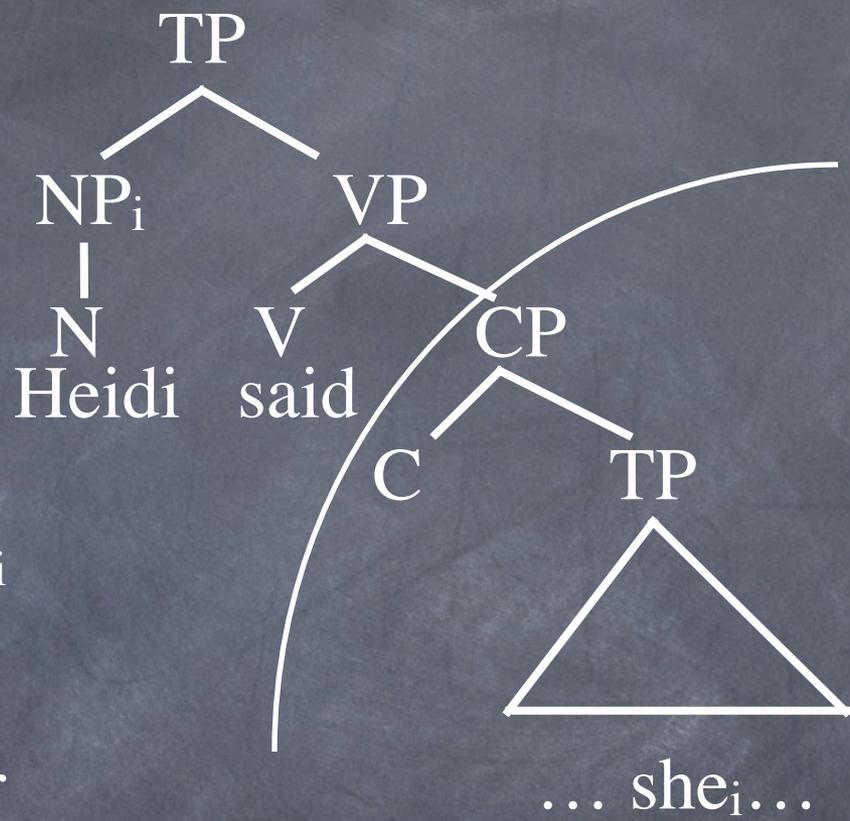
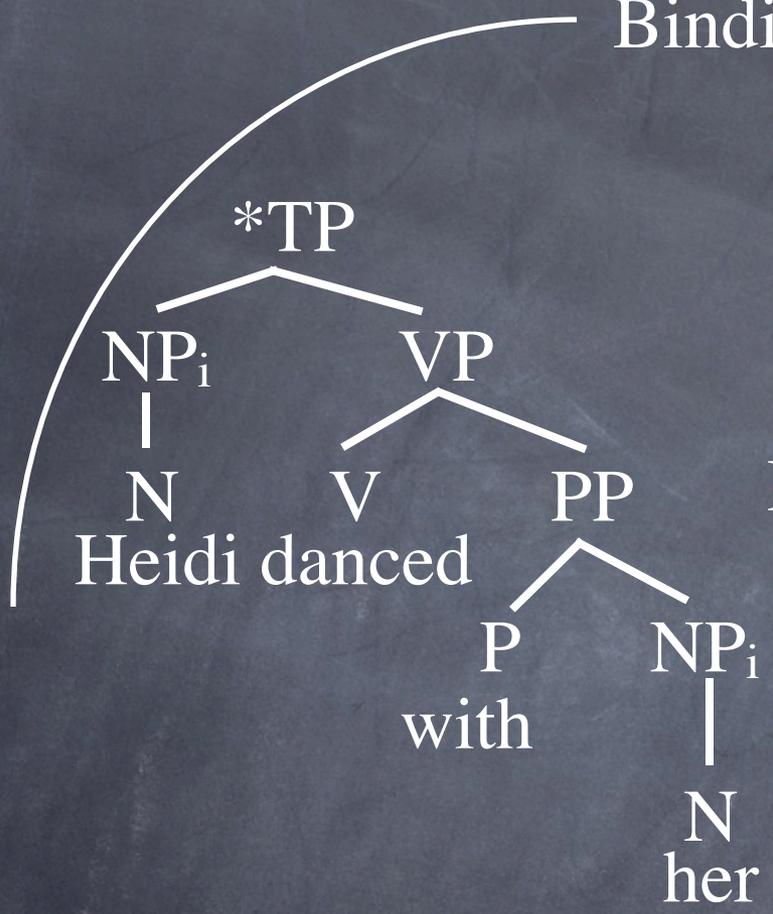
Coindexed? **yes**

C-command? **yes ∴ Bound**

Free in domain?

VIOLATES PRINCIPLE B

Binding domain for pronoun



Binding domain

Coindexed? **yes**

C-command? **yes ∴ Bound**

Free in domain? **no**

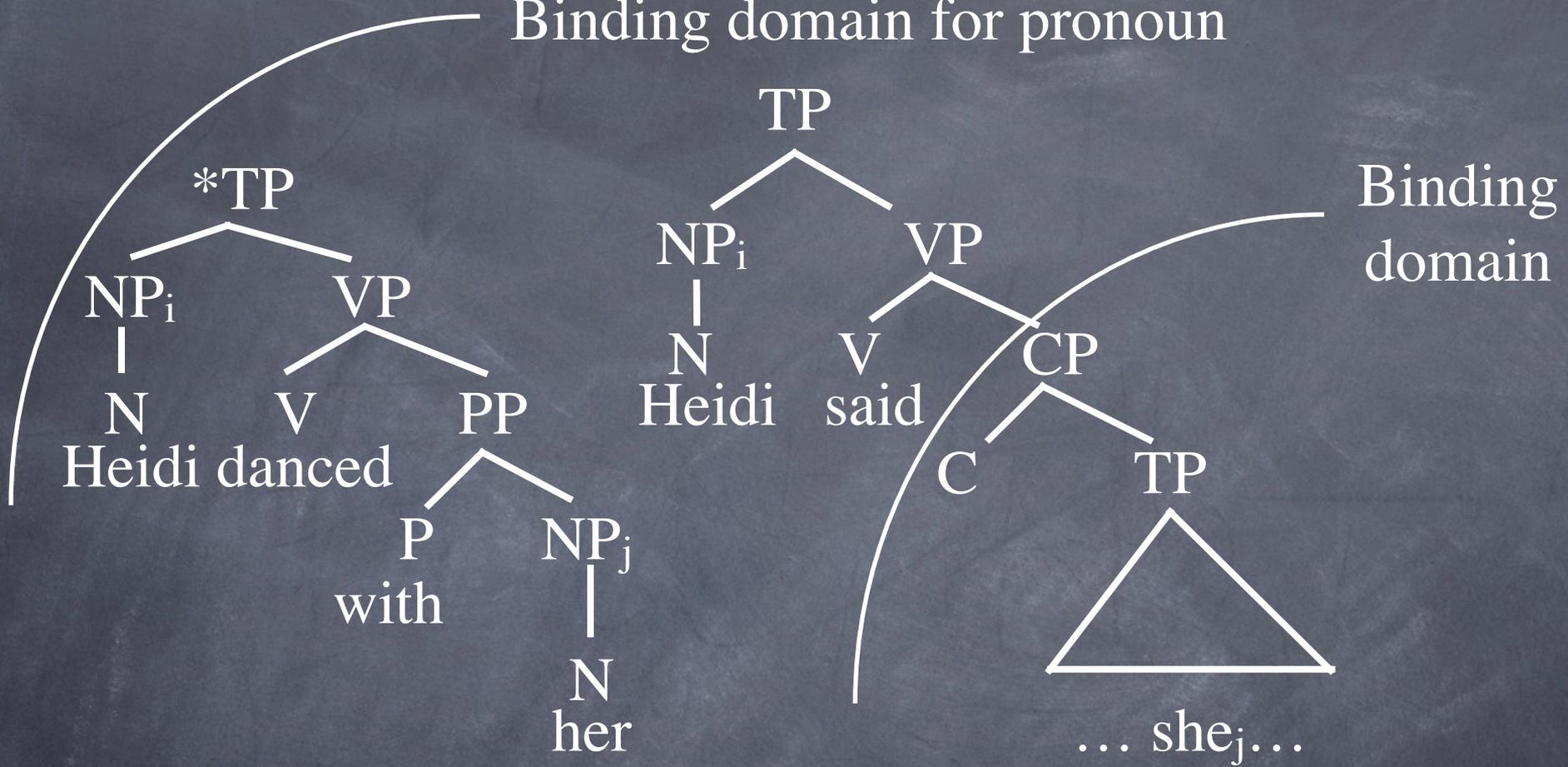
Coindexed? **yes**

C-command? **yes ∴ Bound**

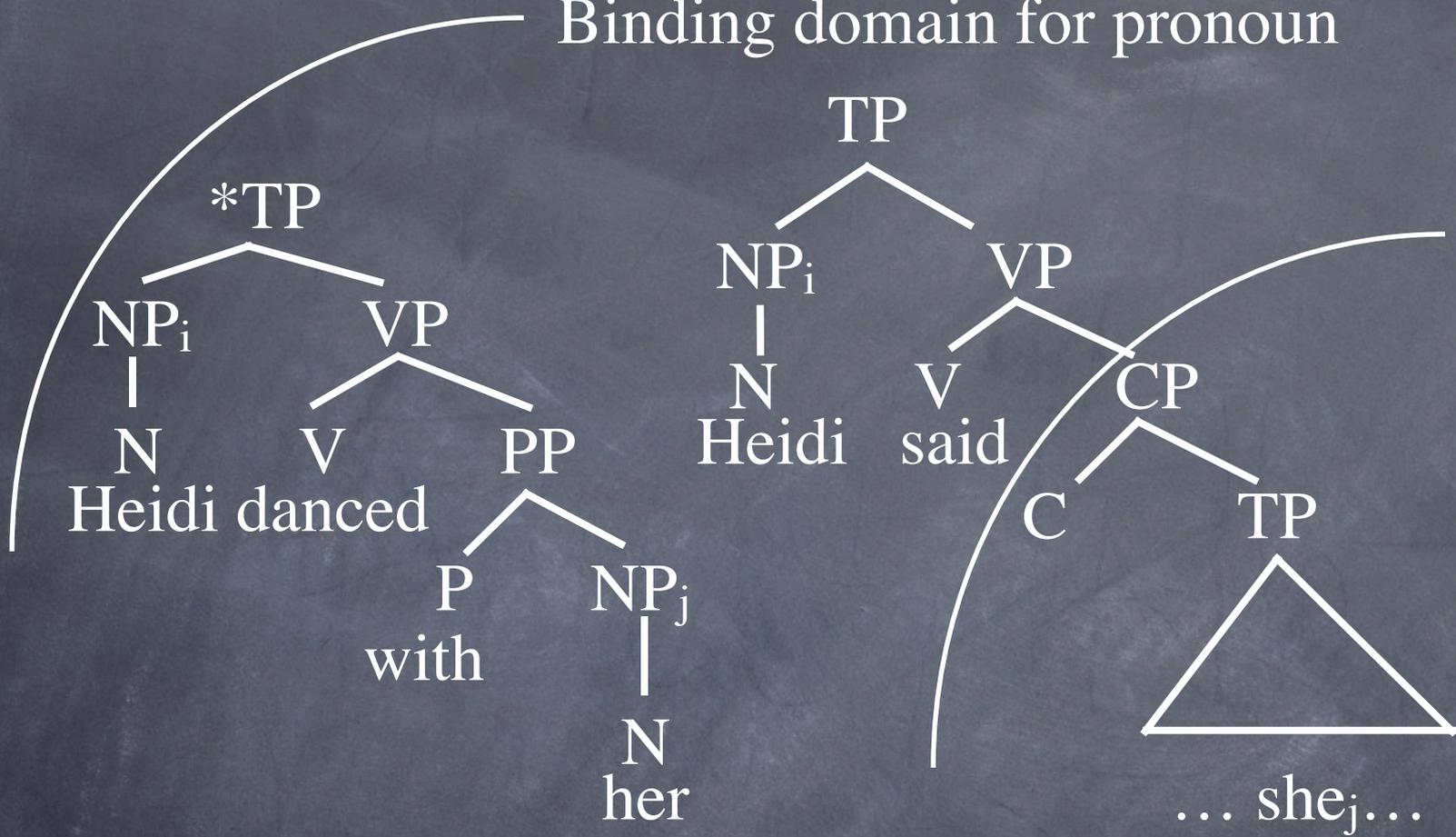
Free in domain? **yes**

VIOLATES PRINCIPLE B

Binding domain for pronoun



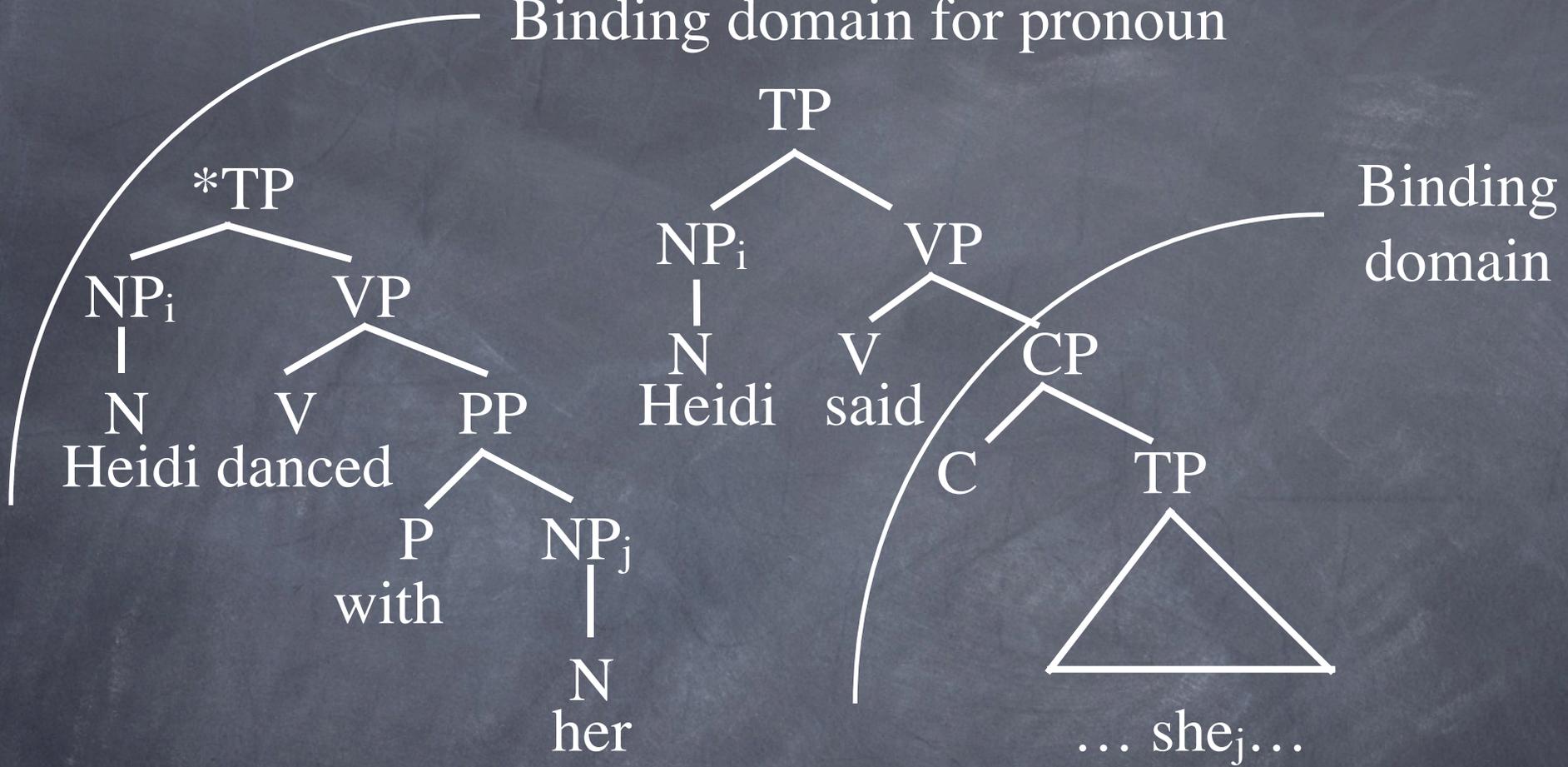
Binding domain for pronoun



Binding domain

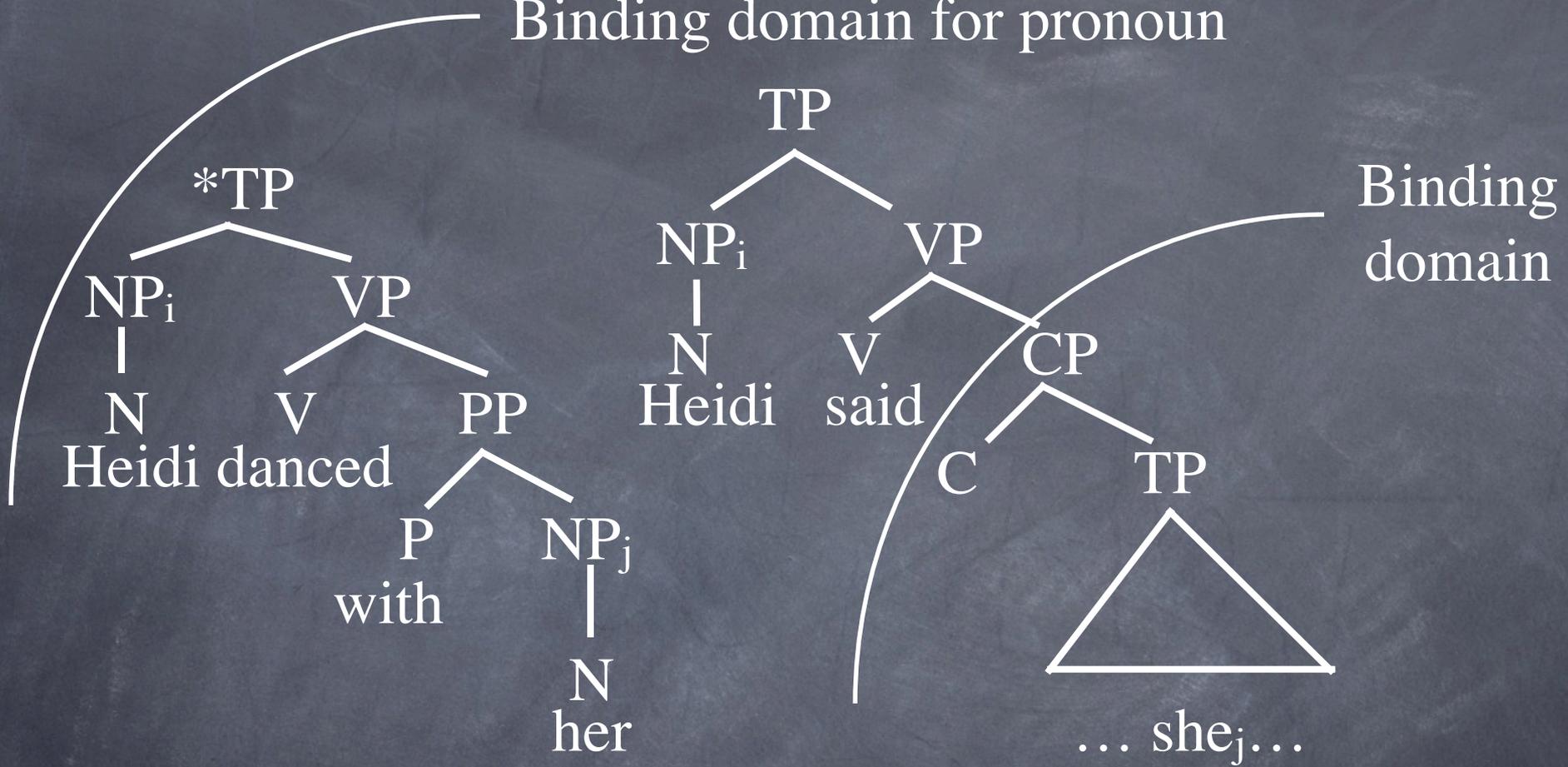
Coindexed?

Binding domain for pronoun



Coindexed? **no ∴ not Bound**

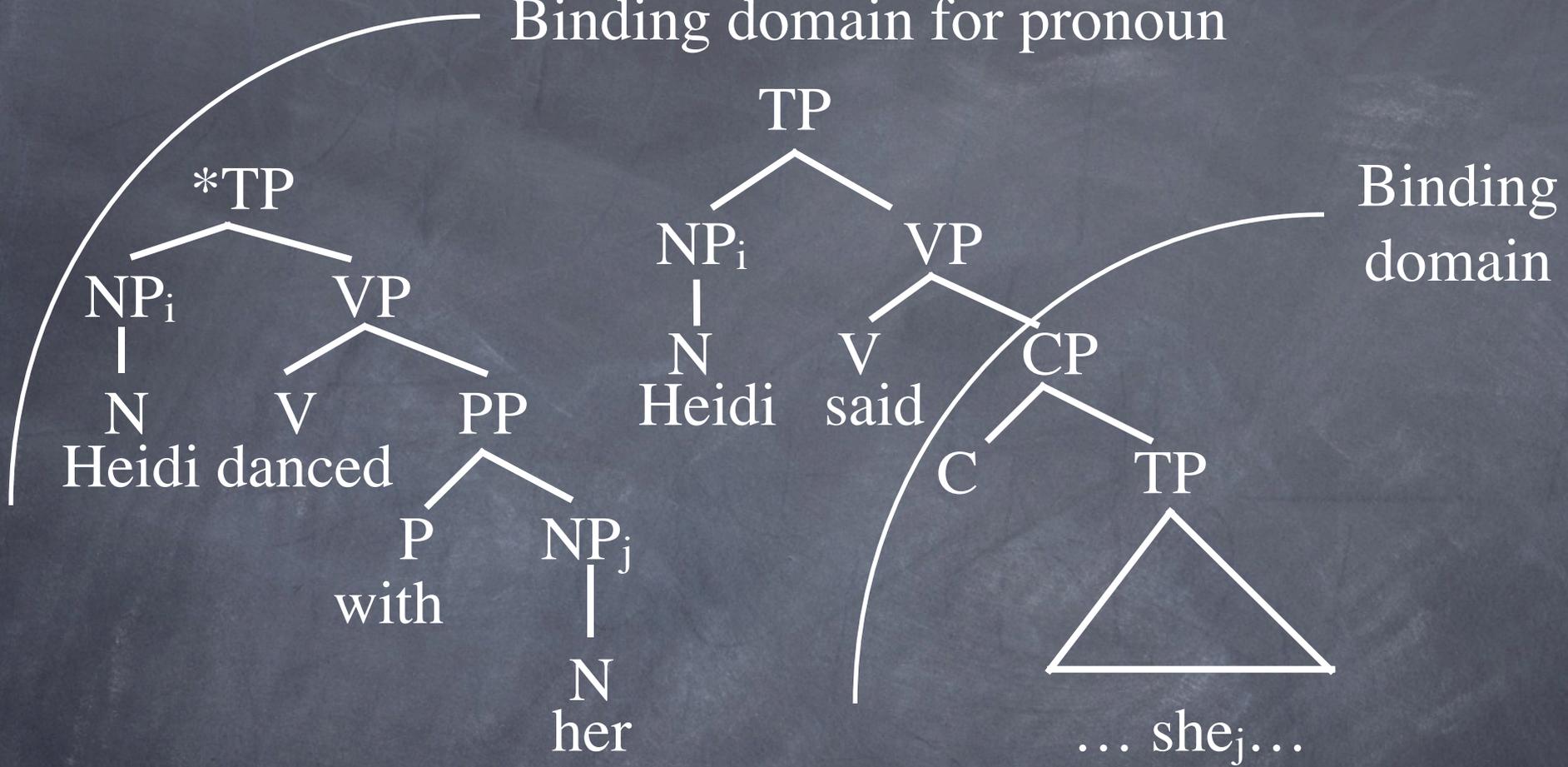
Binding domain for pronoun



Coindexed? **no** ∴ **not Bound**

Free in domain?

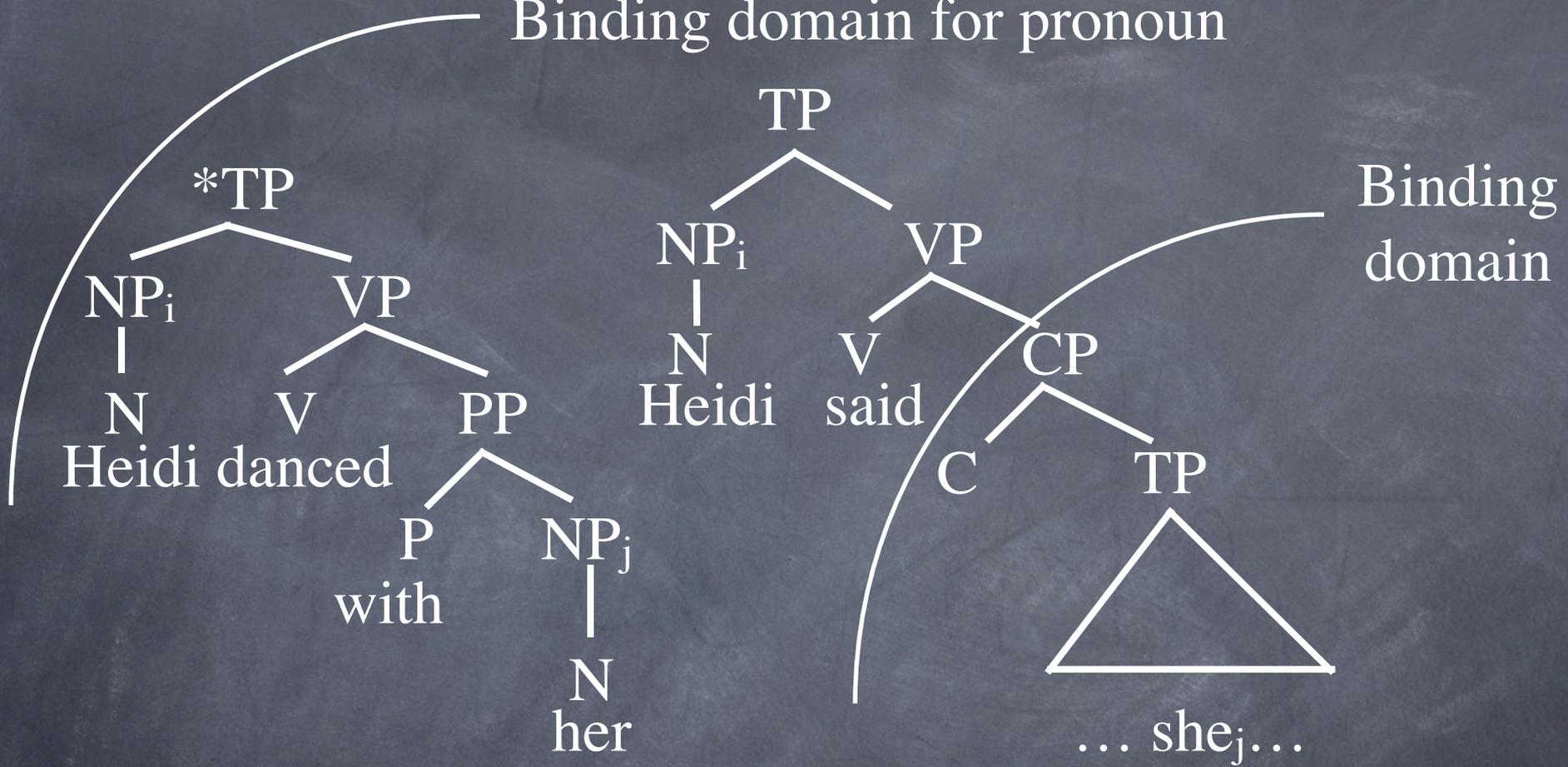
Binding domain for pronoun



Coindexed? **no** ∴ **not Bound**

Free in domain? **Yes**

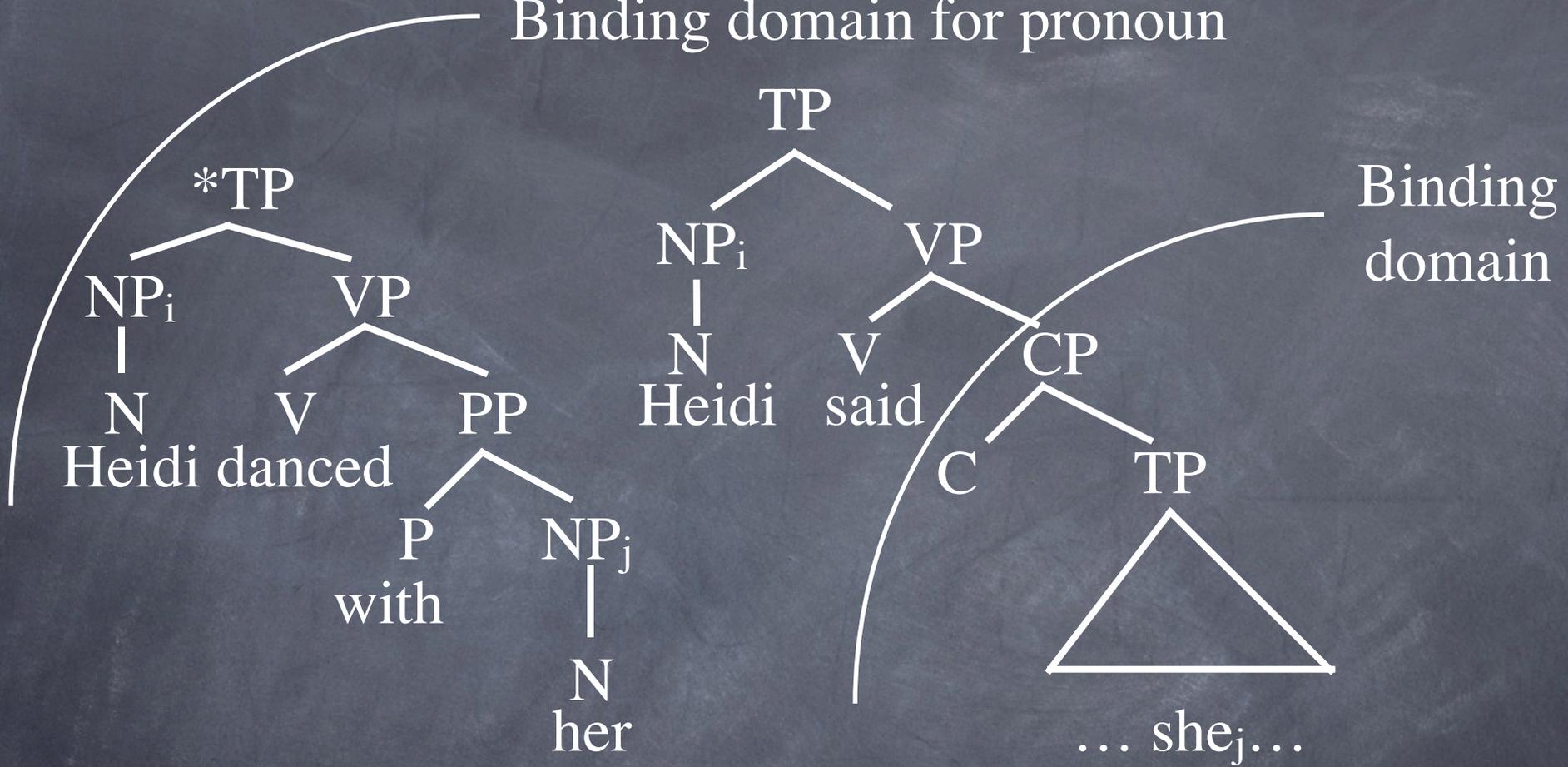
Binding domain for pronoun



Coindexed? **no** ∴ **not Bound** Coindexed?

Free in domain? **Yes**

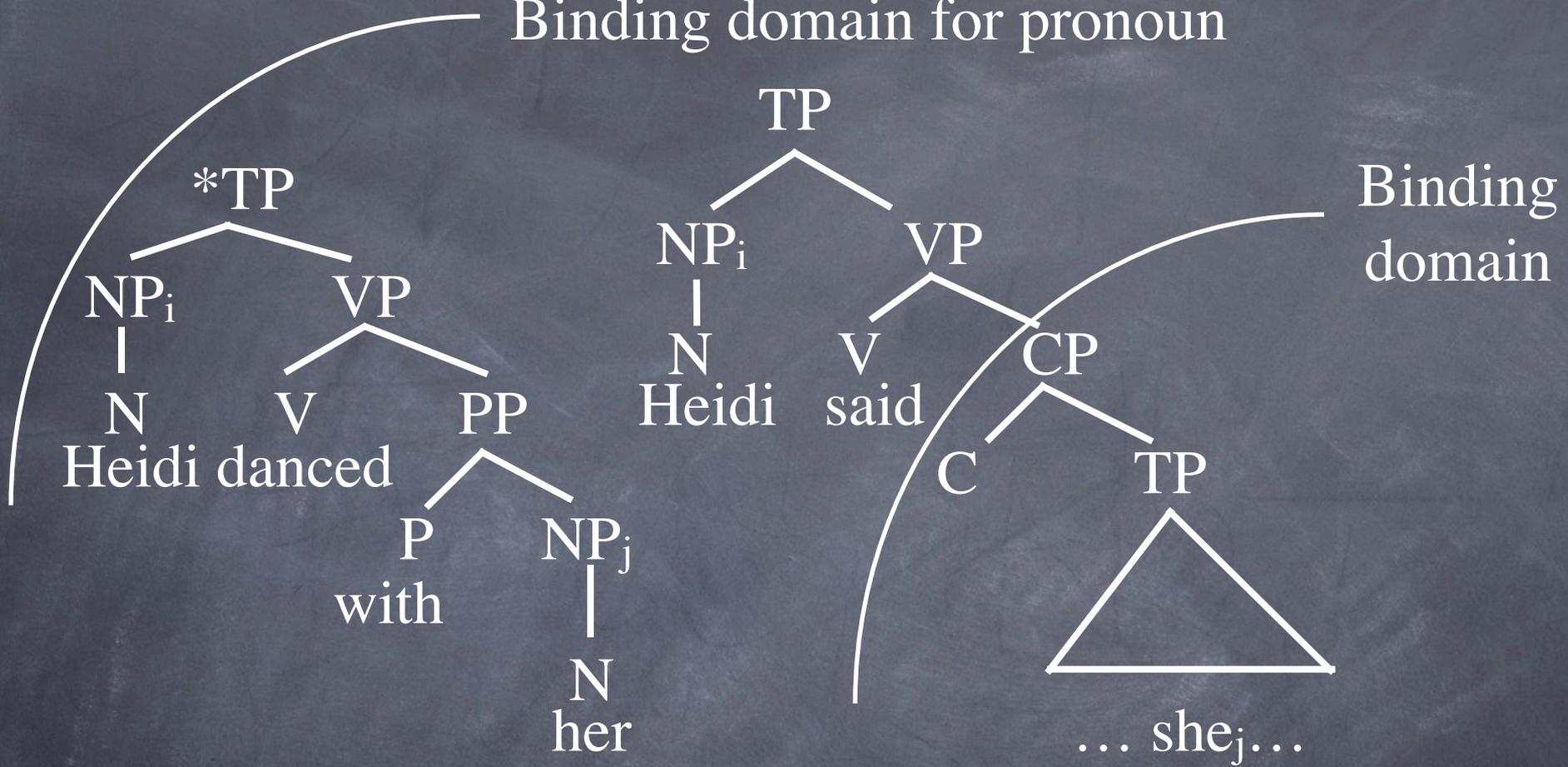
Binding domain for pronoun



Coindexed? **no** ∴ **not Bound** Coindexed? **no** ∴ **not Bound**

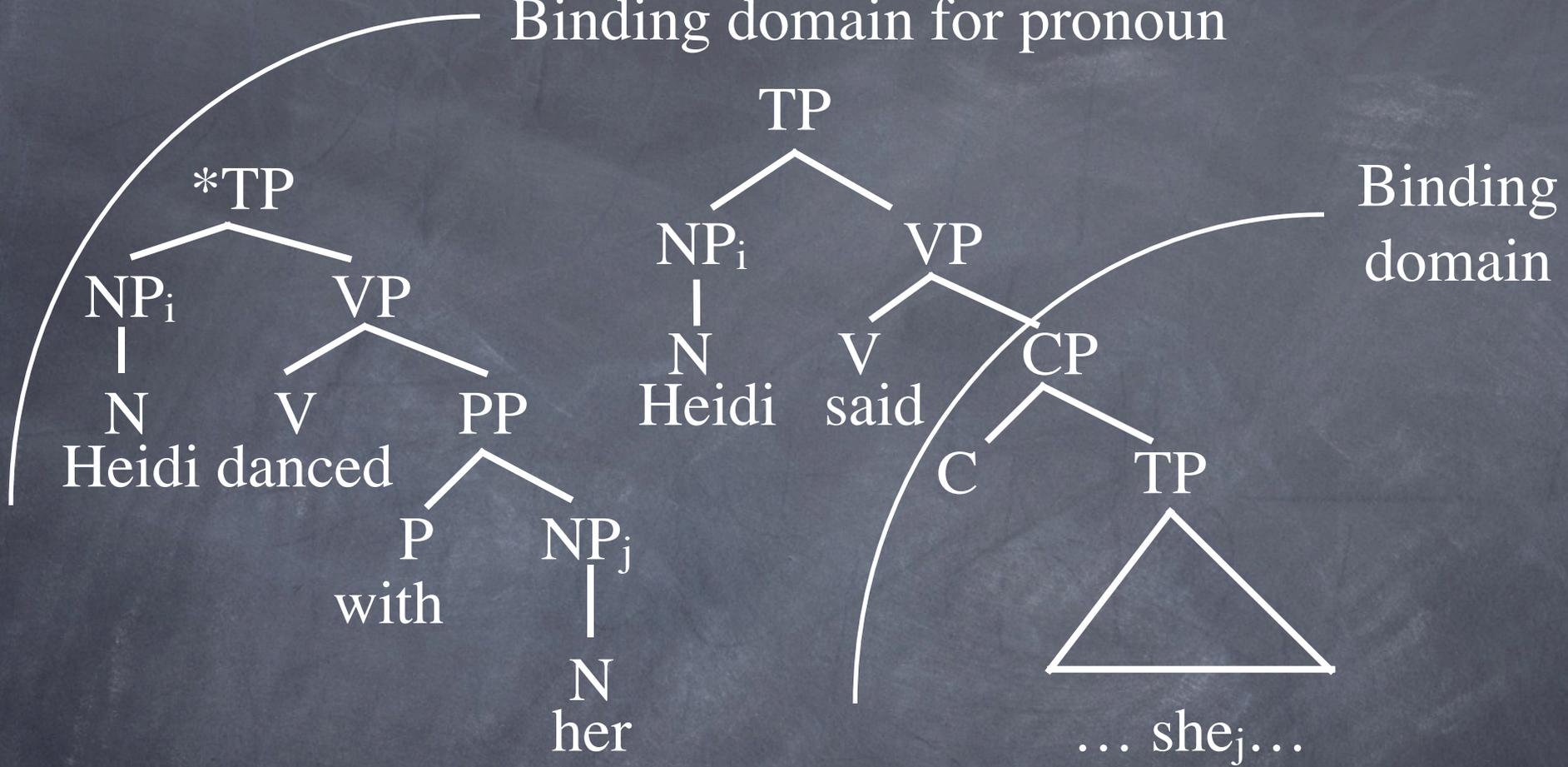
Free in domain? **Yes**

Binding domain for pronoun



Coindexed? **no ∴ not Bound** Coindexed? **no ∴ not Bound**
 Free in domain? **Yes** Free in domain?

Binding domain for pronoun



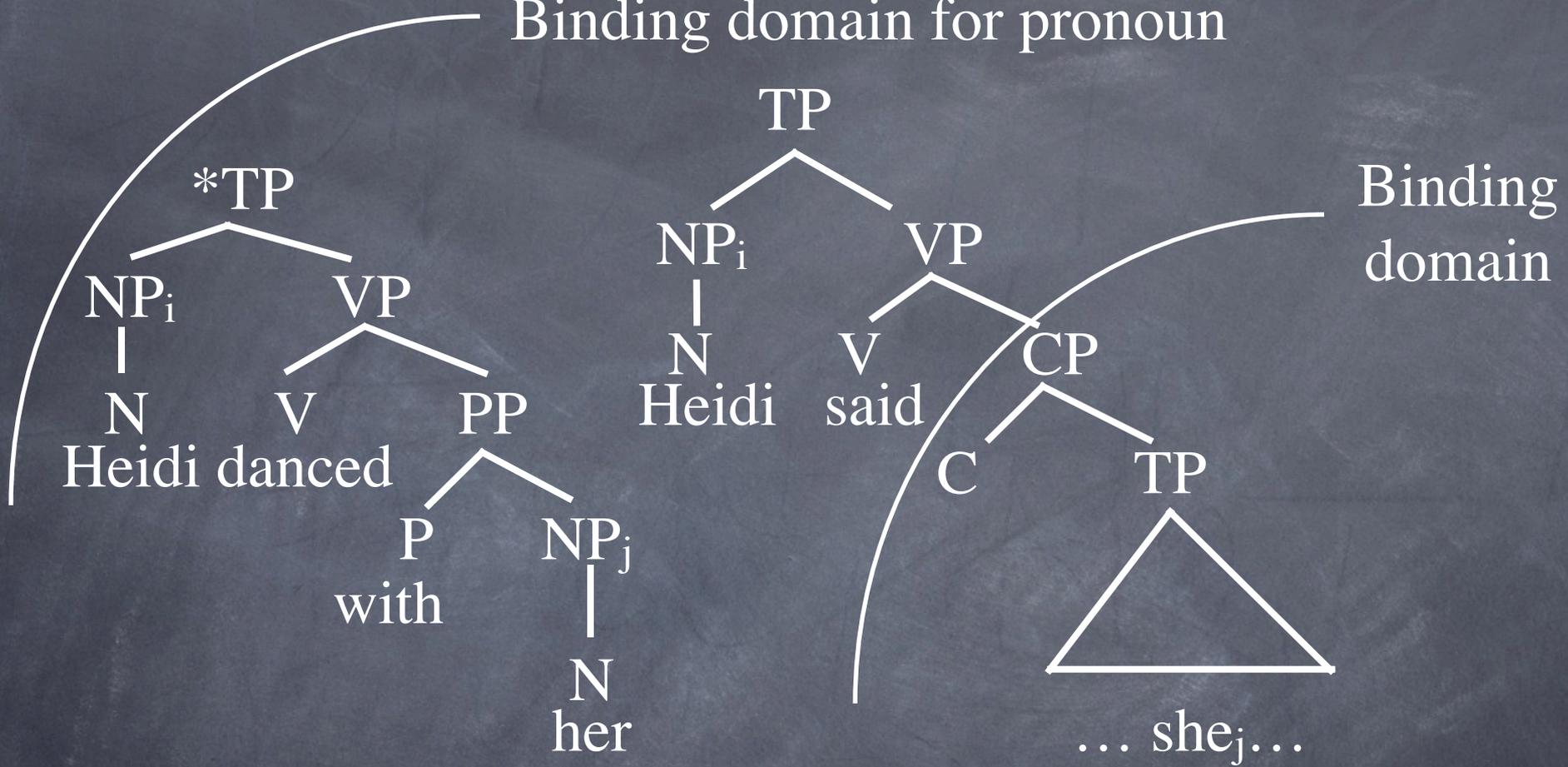
Coindexed? **no** ∴ **not Bound**

Free in domain? **Yes**

Coindexed? **no** ∴ **not Bound**

Free in domain? **Yes**

Binding domain for pronoun



Coindexed? **no** ∴ **not Bound**

Coindexed? **no** ∴ **not Bound**

Free in domain? **Yes**

Free in domain? **Yes**

Both meet condition B

R-expressions

R-expressions

• *Heidi_i kissed Miriam_i

R-expressions

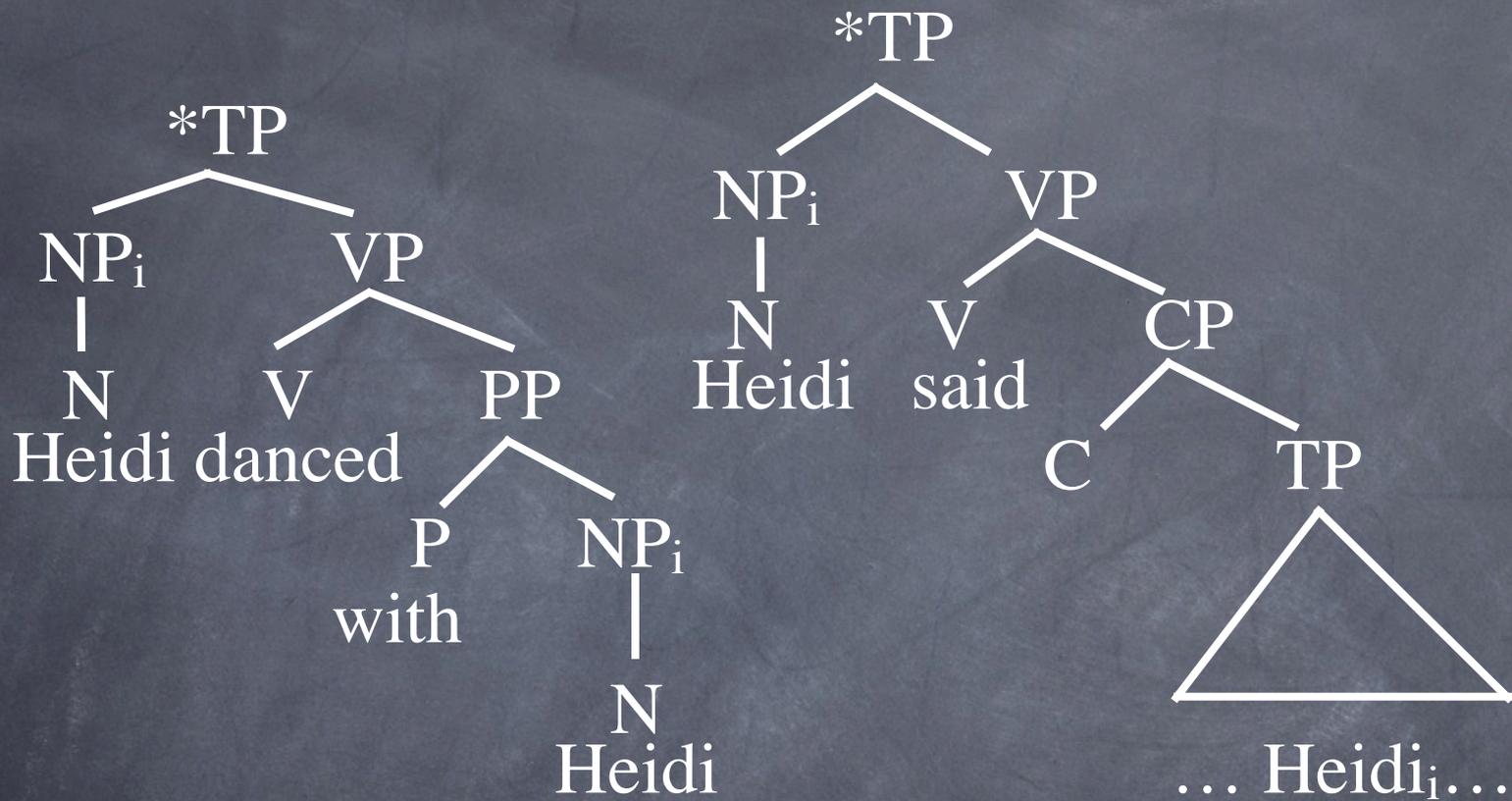
- *Heidi_i kissed Miriam_i
- *She_i kissed Heidi_i

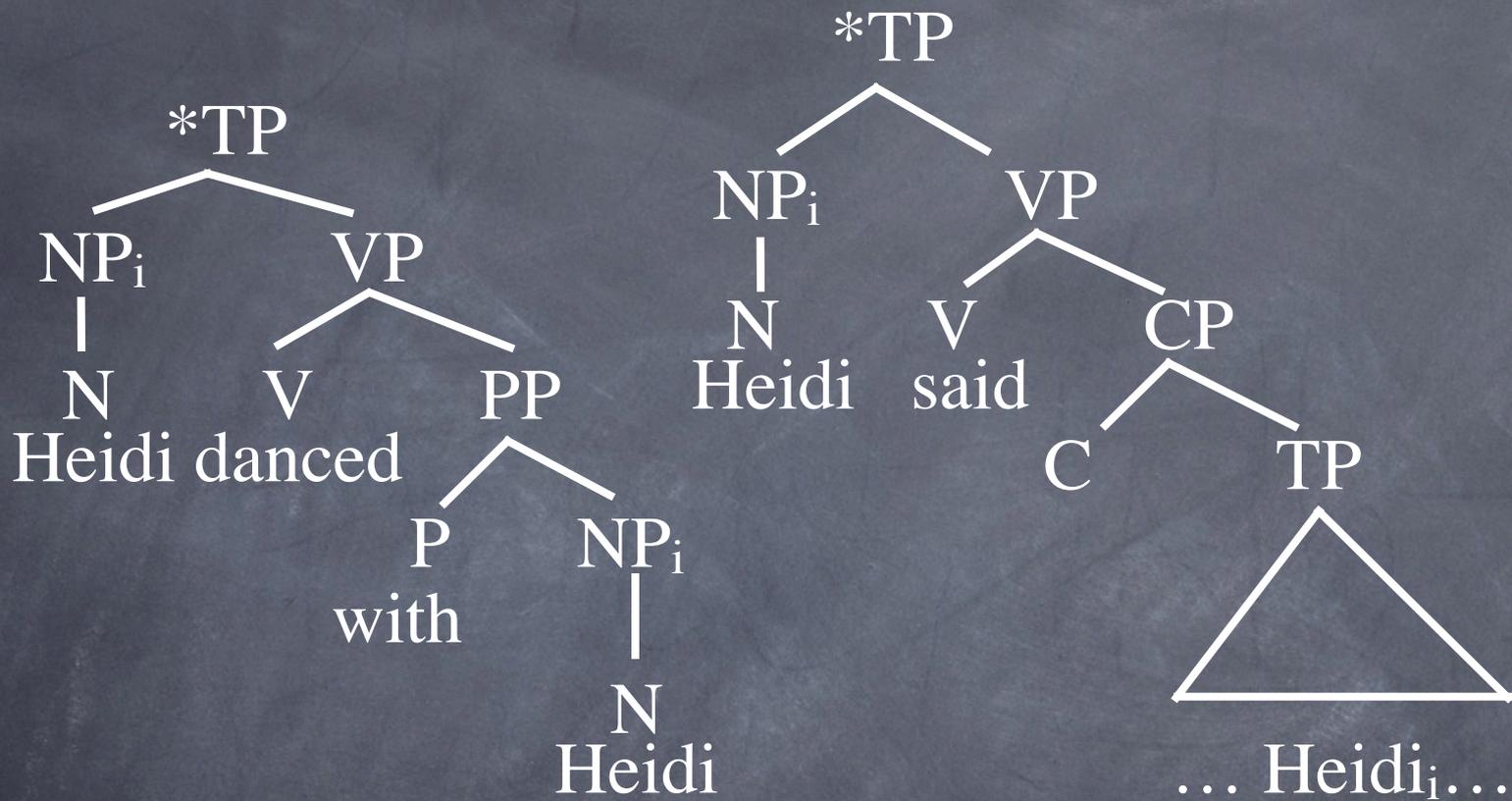
R-expressions

- *Heidi_i kissed Miriam_i
- *She_i kissed Heidi_i
- *She_i said that Heidi_i was a disco queen.

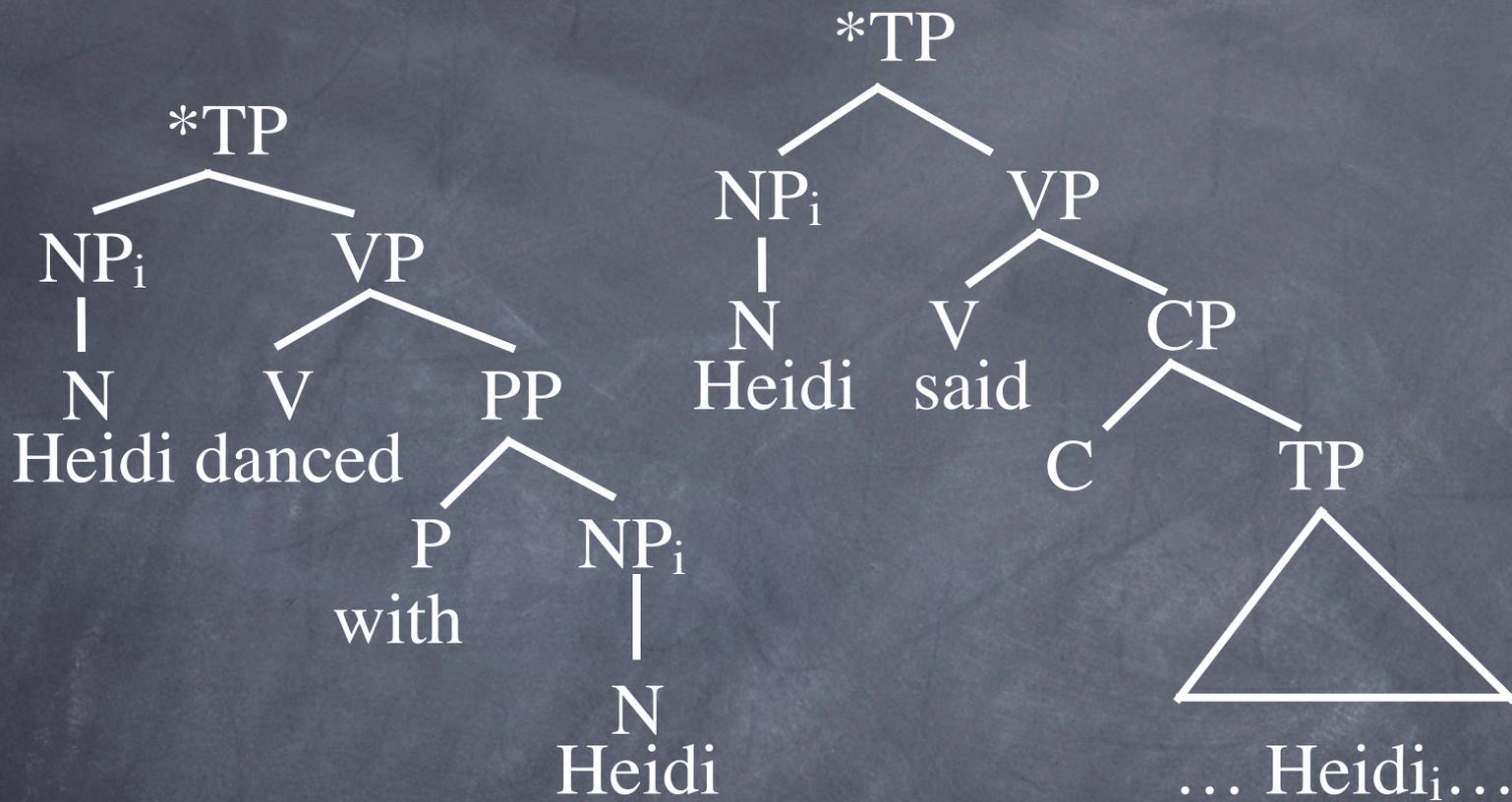
R-expressions

- *Heidi_i kissed Miriam_i
- *She_i kissed Heidi_i
- *She_i said that Heidi_i was a disco queen.
- **Principle C**: R-expressions must be free (everywhere)

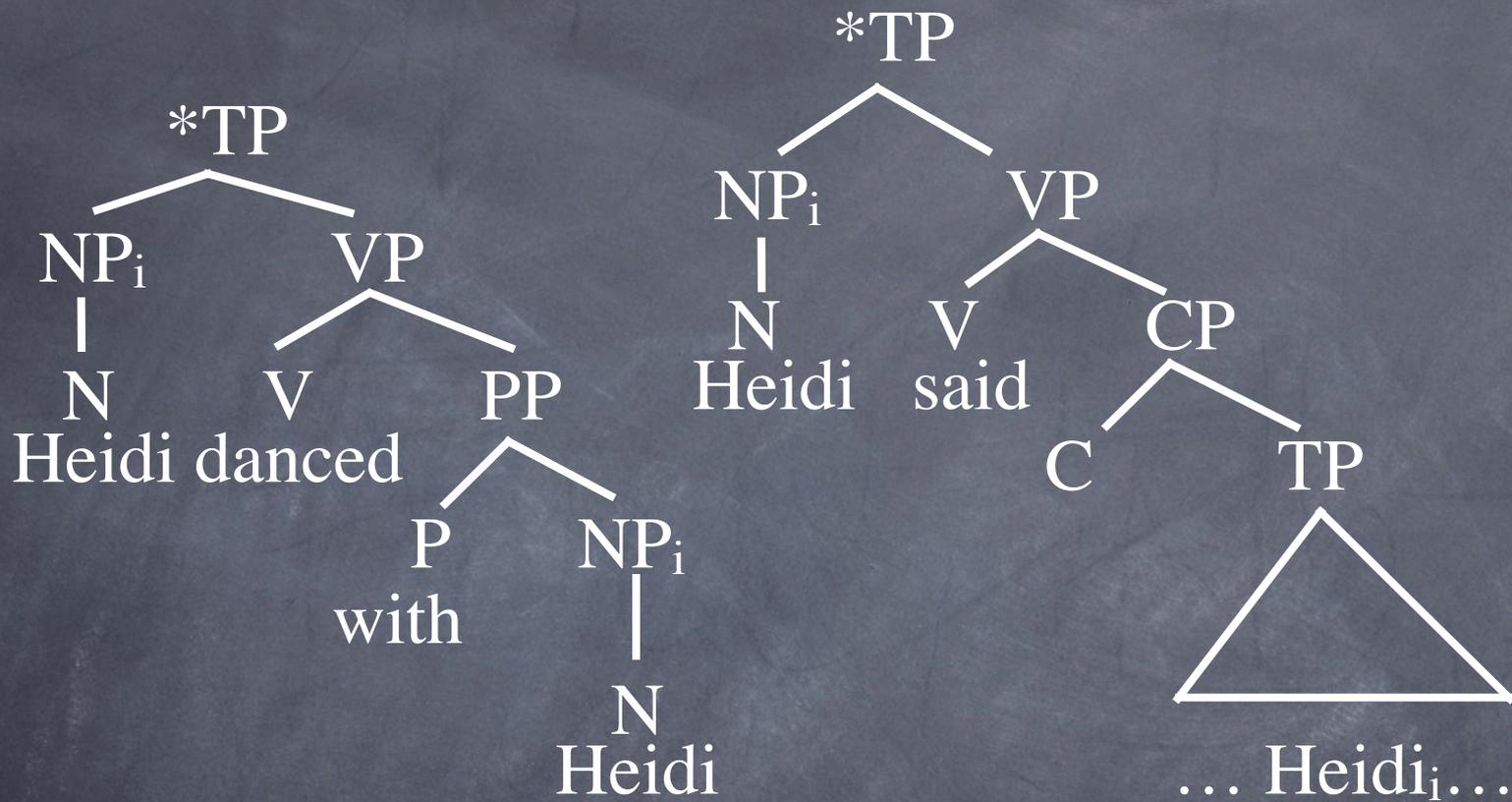




Coindexed?

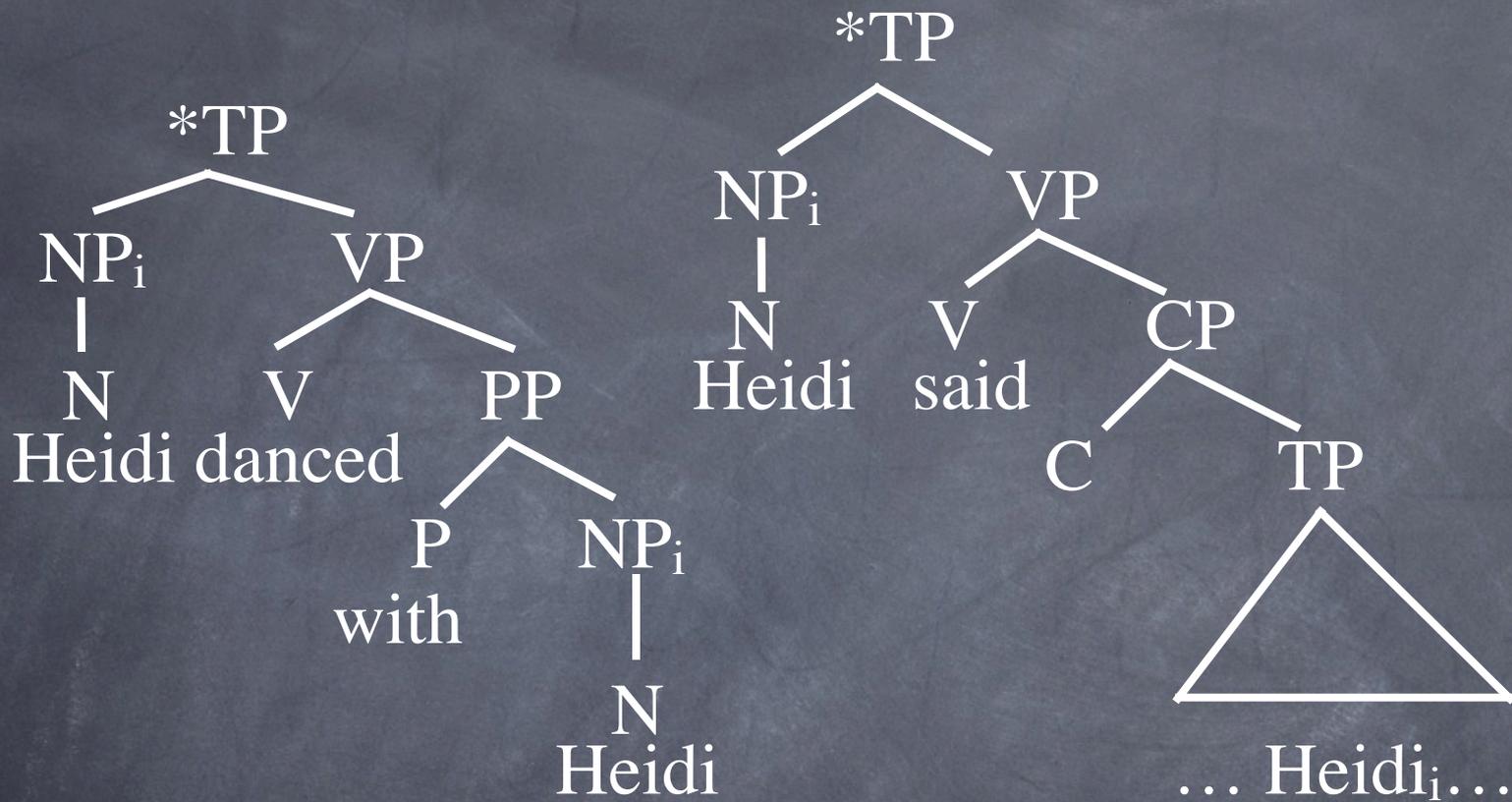


Coindexed? **yes**



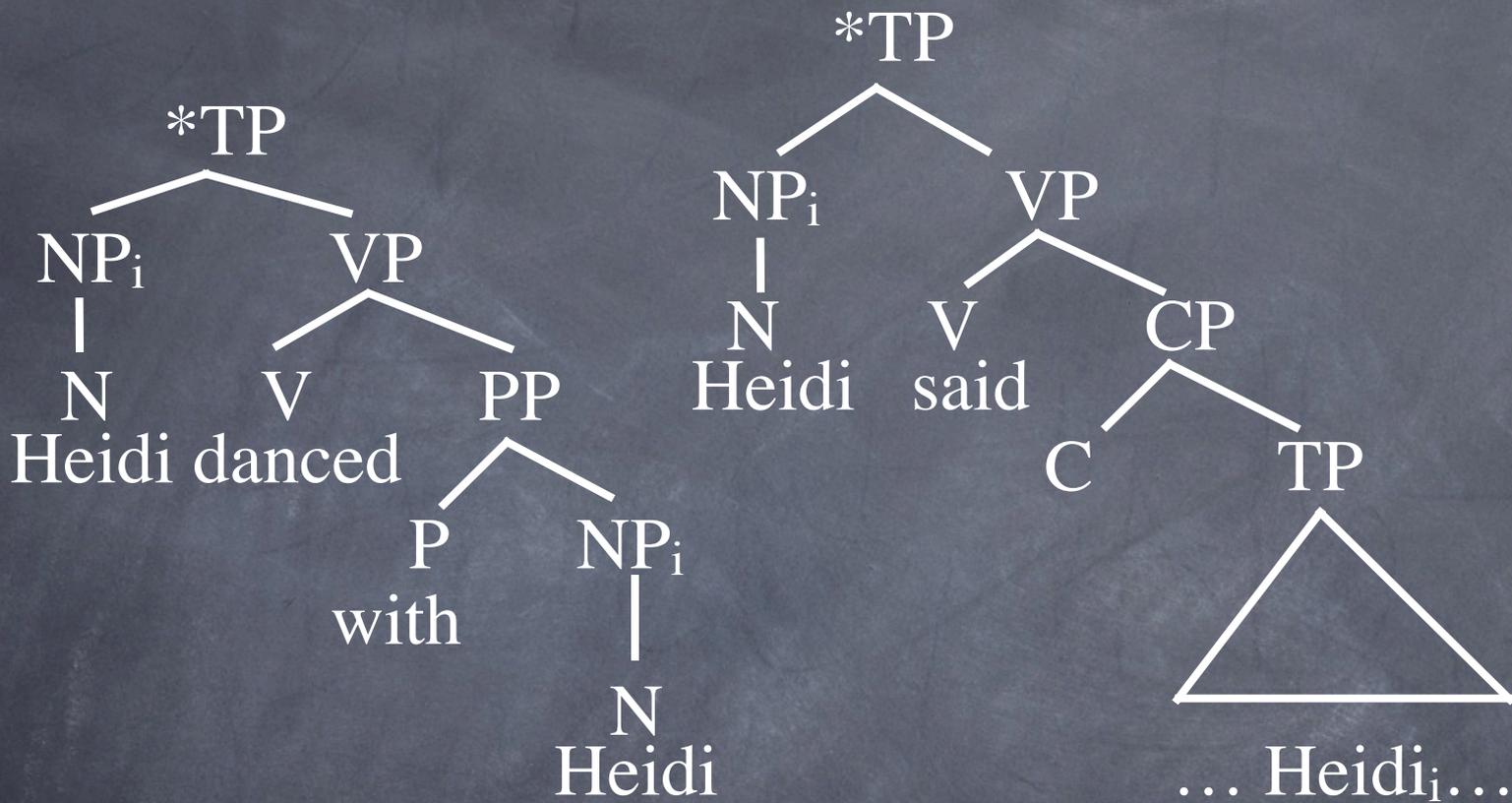
Coindexed? **yes**

C-command?



Coindexed? **yes**

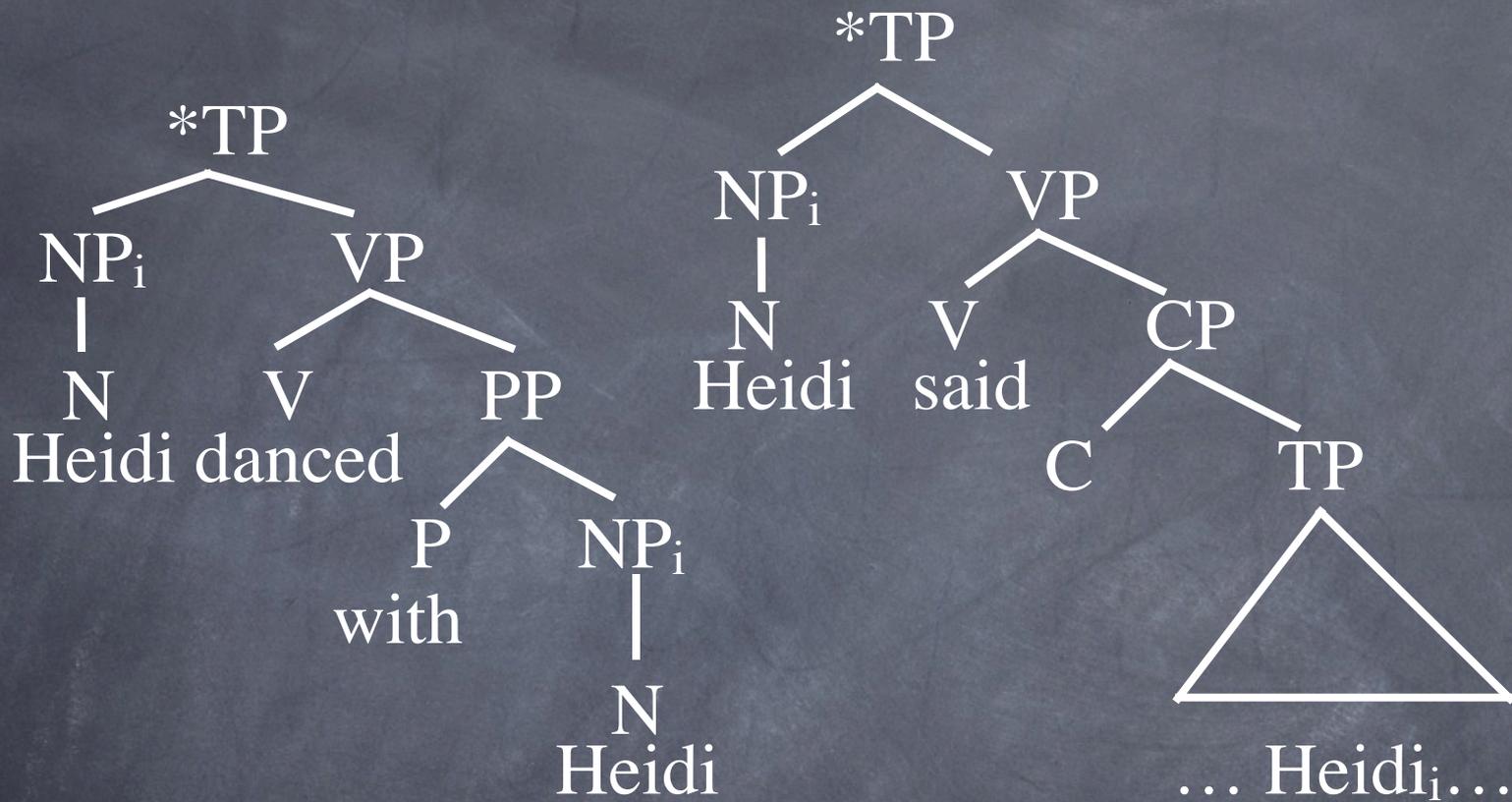
C-command? **yes ∴ Bound**



Coindexed? **yes**

C-command? **yes ∴ Bound**

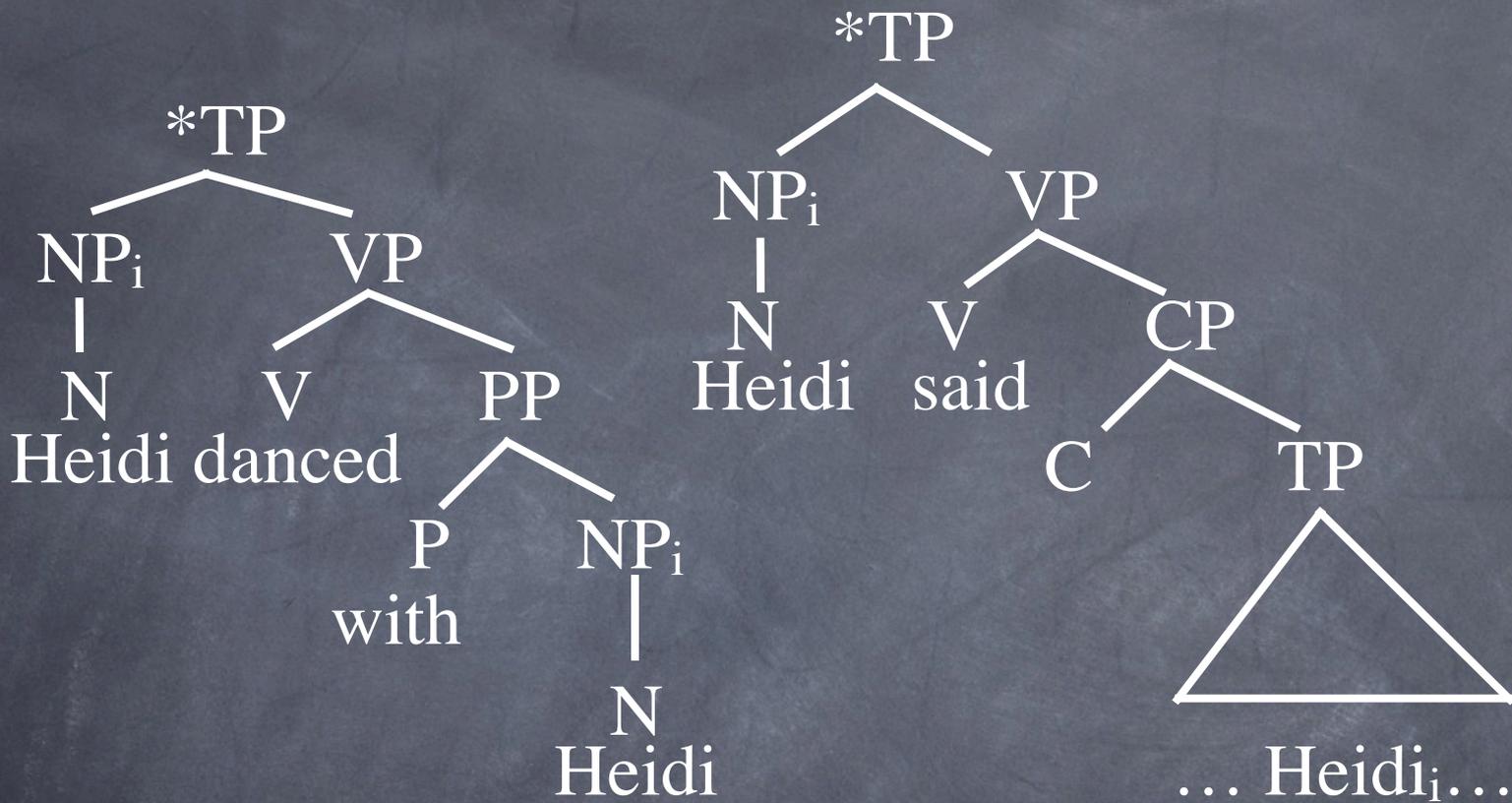
Free?



Coindexed? **yes**

C-command? **yes ∴ Bound**

Free? **no**

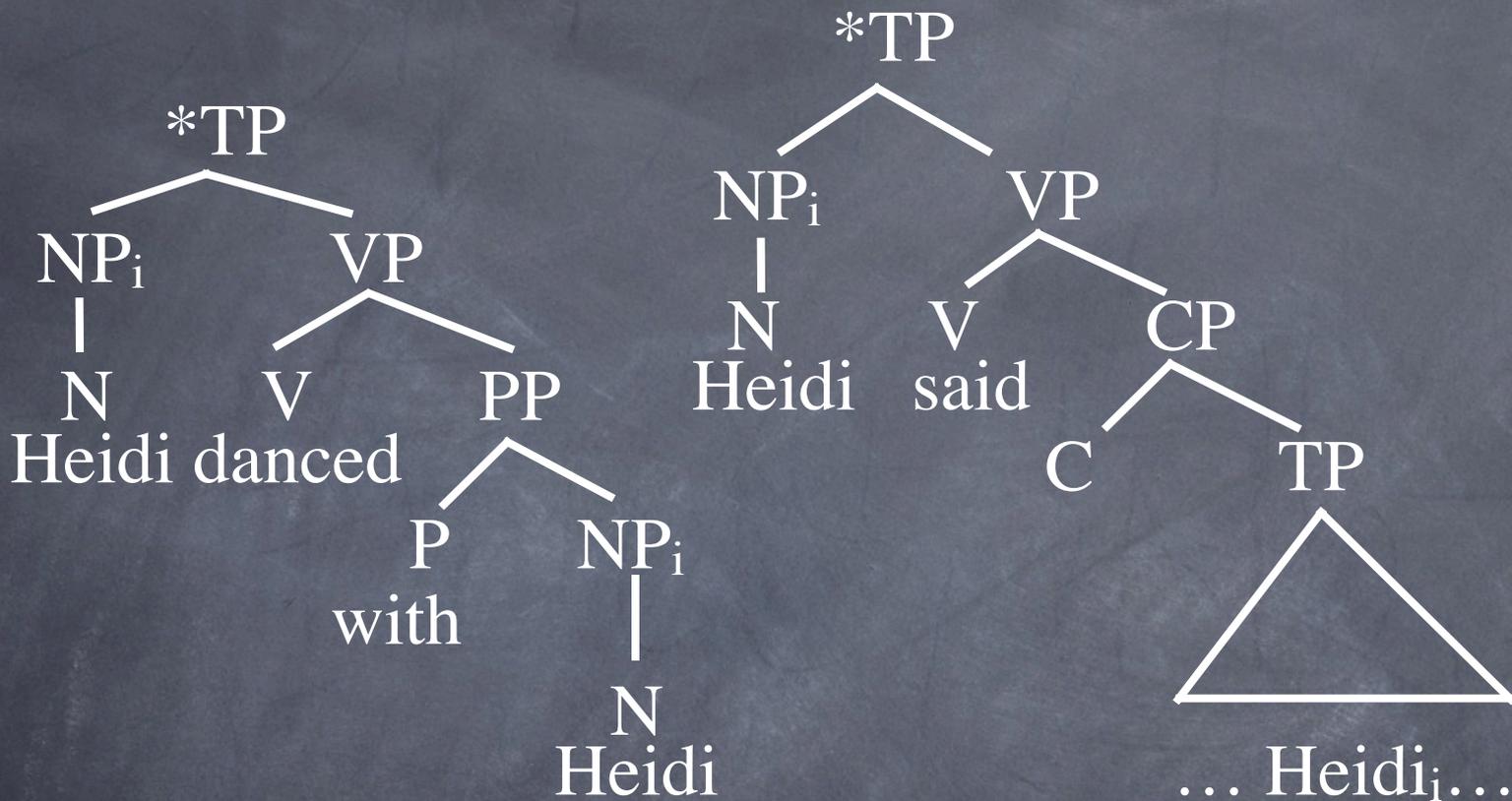


Coindexed? **yes**

C-command? **yes ∴ Bound**

Free? **no**

VIOLATES PRINCIPLE C



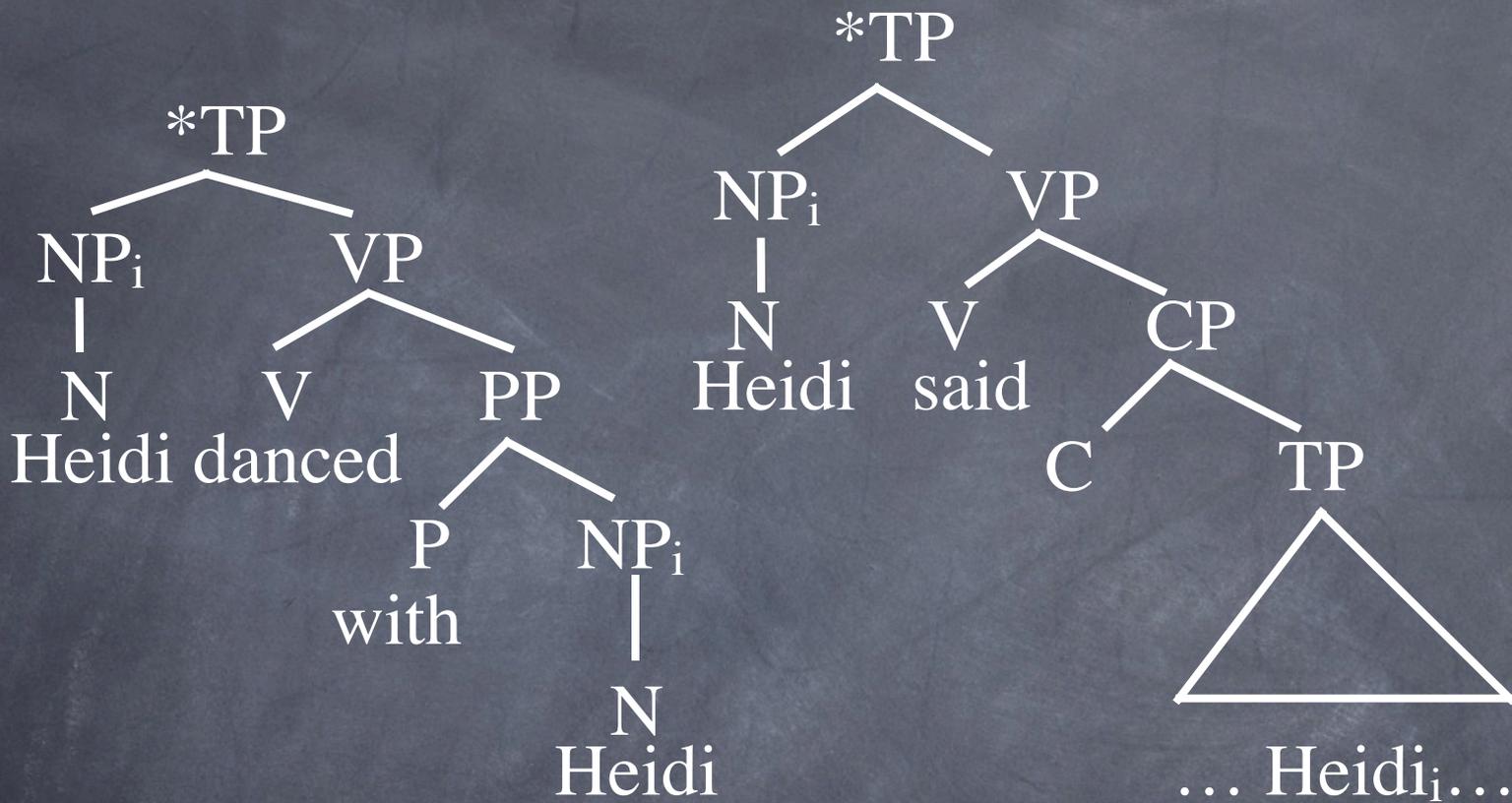
Coindexed? **yes**

Coindexed?

C-command? **yes \therefore Bound**

Free? **no**

VIOLATES PRINCIPLE C



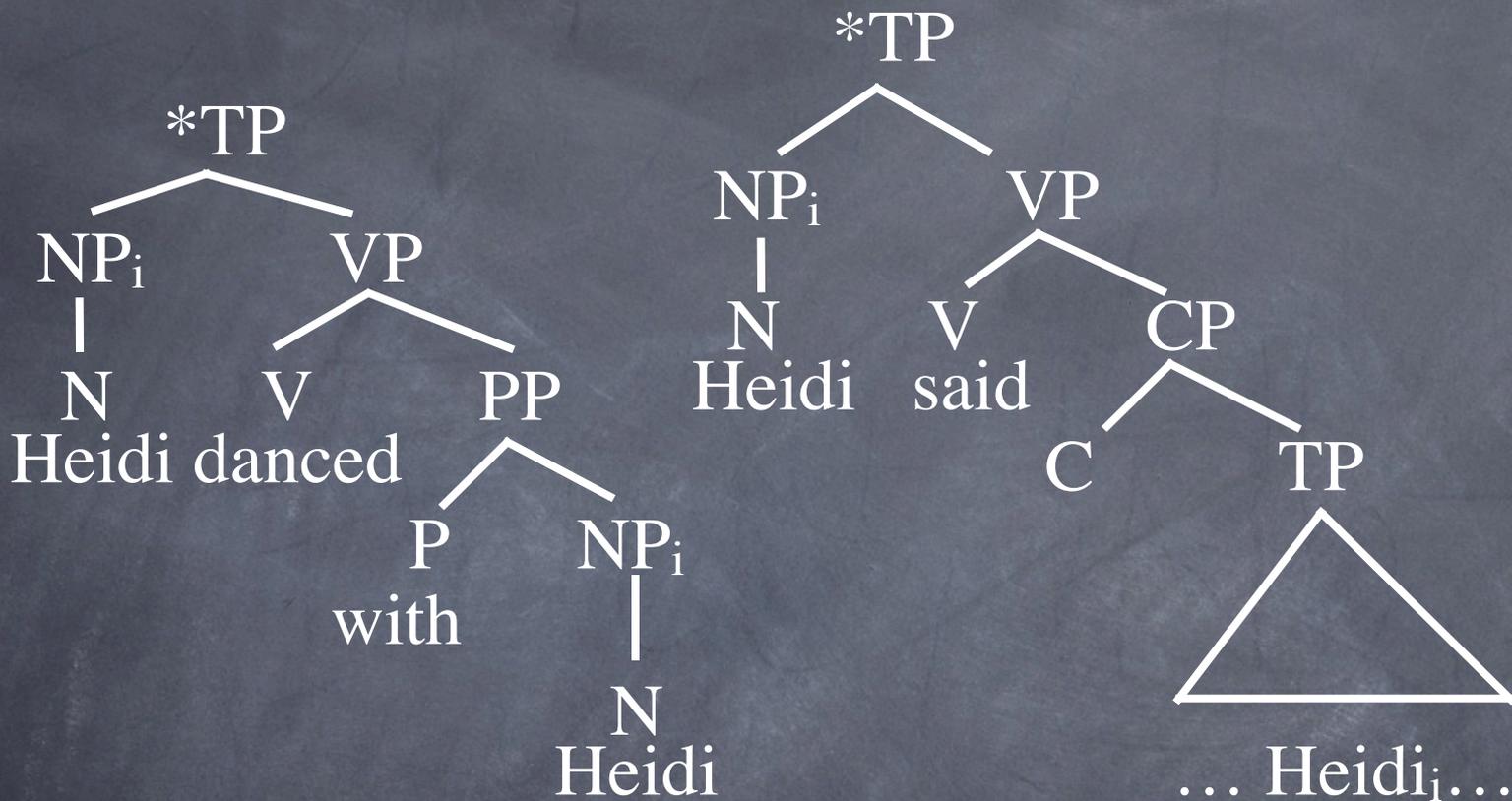
Coindexed? **yes**

Coindexed? **yes**

C-command? **yes ∴ Bound**

Free? **no**

VIOLATES PRINCIPLE C



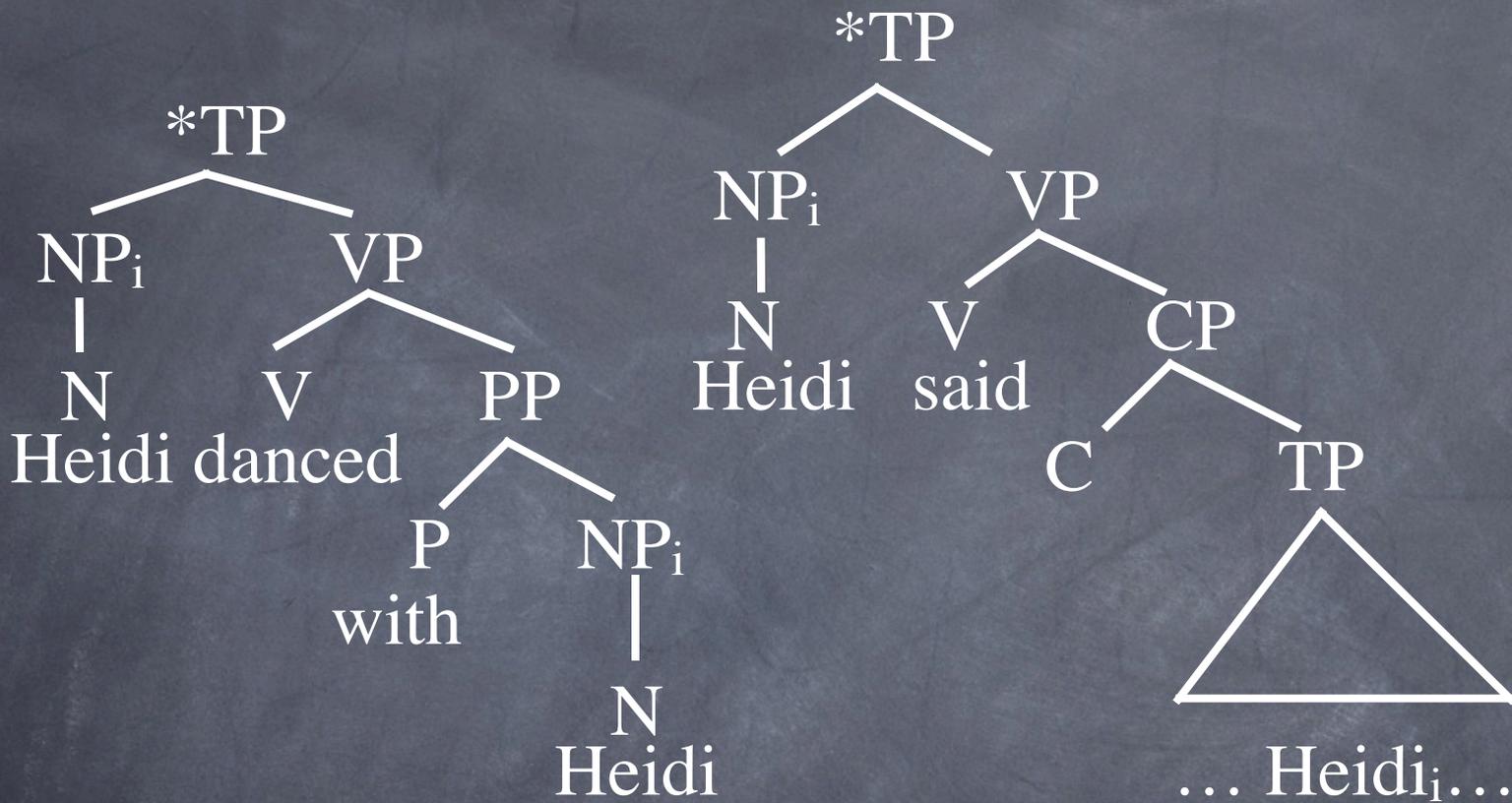
Coindexed? **yes**

Coindexed? **yes**

C-command? **yes** **∴ Bound** C-command?

Free? **no**

VIOLATES PRINCIPLE C



Coindexed? **yes**

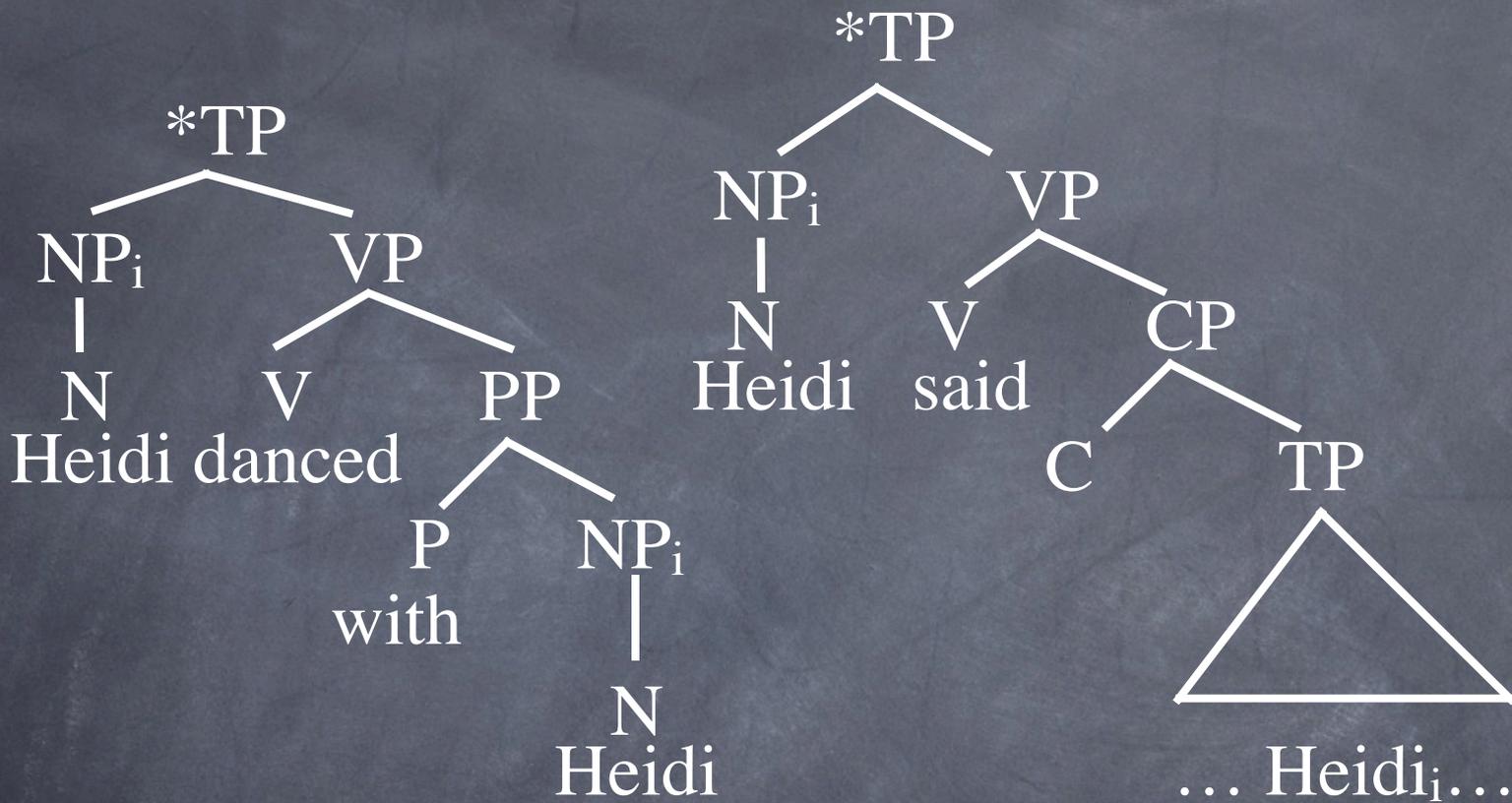
Coindexed? **yes**

C-command? **yes** \therefore Bound

C-command? **yes** \therefore Bound

Free? **no**

VIOLATES PRINCIPLE C



Coindexed? **yes**

Coindexed? **yes**

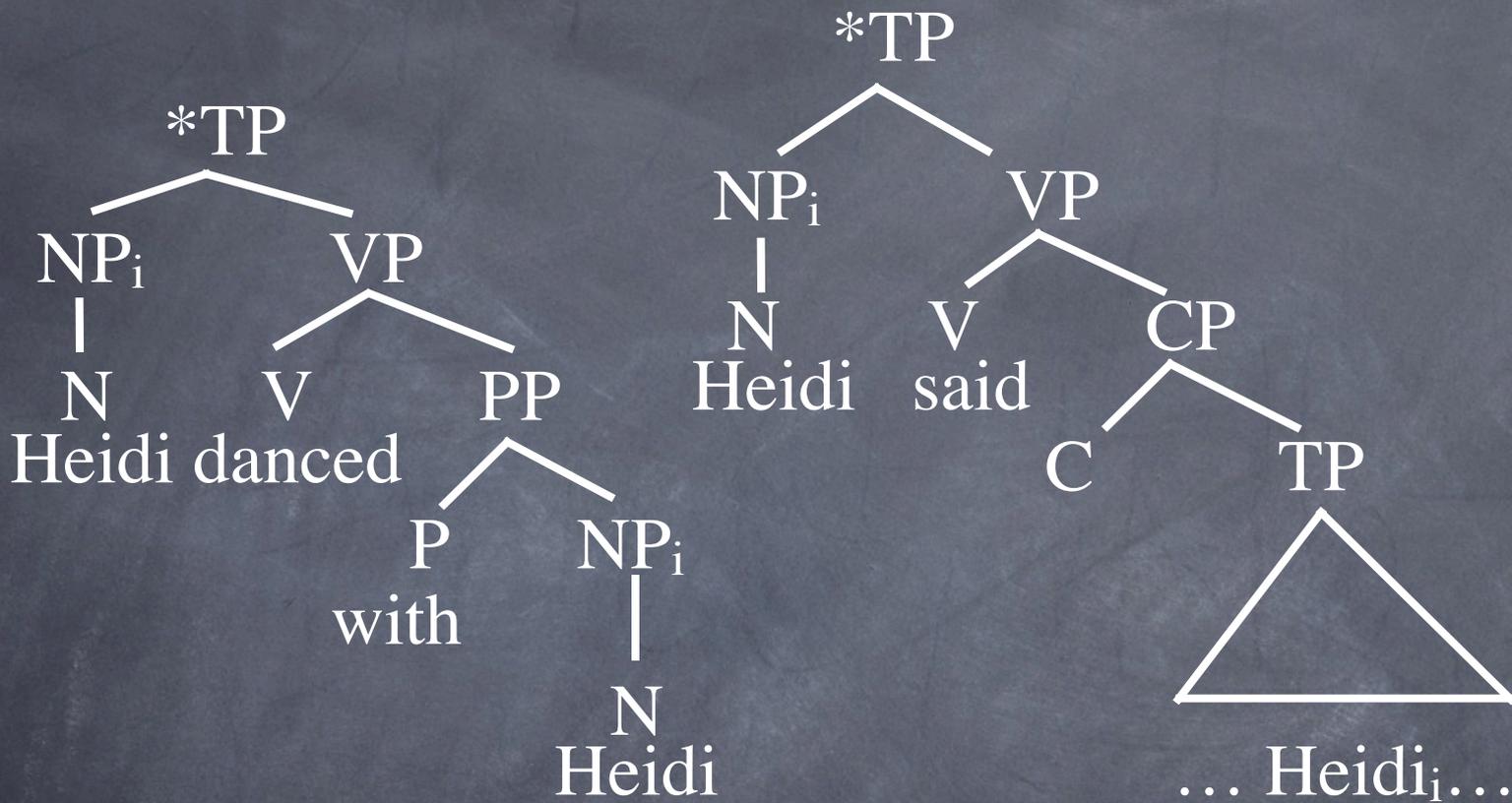
C-command? **yes ∴ Bound**

C-command? **yes ∴ Bound**

Free? **no**

Free

VIOLATES PRINCIPLE C



Coindexed? **yes**

Coindexed? **yes**

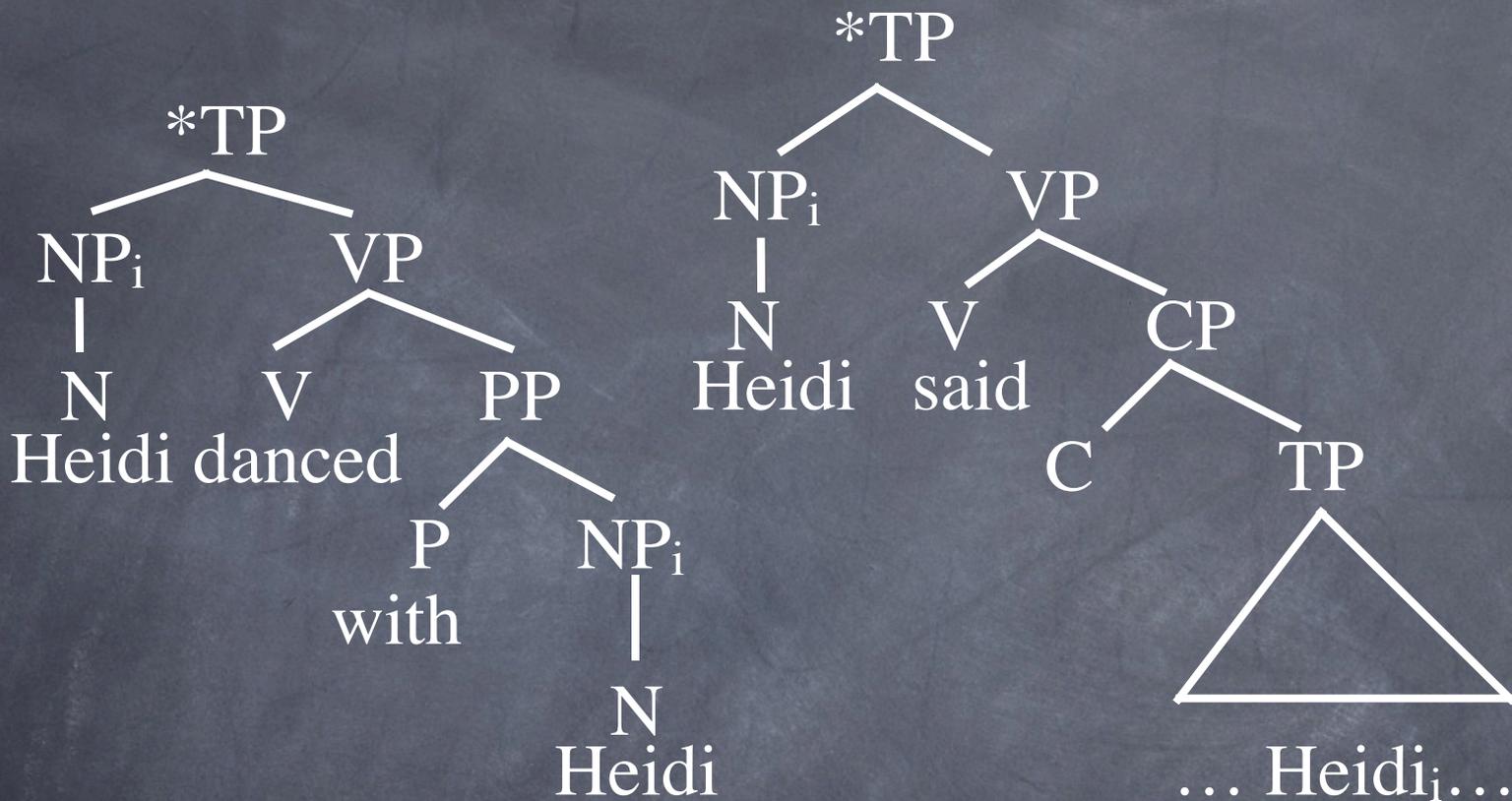
C-command? **yes ∴ Bound**

C-command? **yes ∴ Bound**

Free? **no**

Free **no**

VIOLATES PRINCIPLE C



Coindexed? **yes**

Coindexed? **yes**

C-command? **yes** \therefore **Bound**

C-command? **yes** \therefore **Bound**

Free? **no**

Free **no**

VIOLATES PRINCIPLE C

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Summary

Summary

- Antecedent, Anaphor, index, pronoun, R-expression, co-reference

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 - A binds B if and only if
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Summary

- Antecedent, Anaphor, index, pronoun, R-expression, co-reference
- **Binds:**
 - A binds B if and only if
 - A c-commands B AND
 - A and B are co-indexed
- **Free:** not bound
- **Binding domain:** The clause containing the anaphor/pronoun

Summary: The binding principles

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- **Binding Principle A:** An anaphor must be bound in its binding domain.

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- **Binding Principle B:** Pronouns must be free in their binding domain

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- **Binding Principle A:** An anaphor must be bound in its binding domain.
- **Binding Principle B:** Pronouns must be free in their binding domain
- **Binding Principle C:** R-expressions must be free