

# 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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- **Heidi** bopped **herself** on the head with a zucchini

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# Indexing

- Means of representing the meaning of an NP
- Each index (plural: indices) represents a different reference.
  - a) [Colin]<sub>i</sub> gave [Andrea]<sub>j</sub> [a basketball]<sub>k</sub>
  - b) [Art]<sub>i</sub> said that [he]<sub>j</sub> played [basketball]<sub>k</sub> in [the dark]<sub>i</sub>
  - c) [Art]<sub>i</sub> said that [he]<sub>i</sub> played [basketball]<sub>k</sub> in [the dark]<sub>i</sub>
  - d) [Heidi]<sub>i</sub> bopped [herself]<sub>i</sub> on [the head]<sub>j</sub> with [a zucchini]<sub>k</sub>
- Start at the left and assign each NP an index starting with i and working down the alphabet. (We sometimes skip j or l because they look like i.)

# Co-indexing & Co-reference

- 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]<sub>i</sub> said that [he]<sub>j</sub> played [basketball]<sub>k</sub> in [the dark]<sub>i</sub>
  - b) [Art]<sub>i</sub> said that [he]<sub>i</sub> played [basketball]<sub>k</sub> in [the dark]<sub>i</sub>

# Syntactic Restrictions on Anaphors

- Heidi<sub>i</sub> bopped herself<sub>i</sub> on the head with a zucchini:
- [Heidi<sub>i</sub>'s mother]<sub>k</sub> bopped herself<sub>k</sub> on the head with a zucchini.
- \* [Heidi<sub>i</sub>'s mother]<sub>k</sub> bopped herself<sub>i</sub> on the head with a zucchini.

# Syntactic Restrictions on Anaphors

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- [Heidi<sub>i</sub>'s mother]<sub>k</sub> bopped herself<sub>k</sub> on the head with a zucchini.
- \* [Heidi<sub>i</sub>'s mother]<sub>k</sub> bopped herself<sub>i</sub> on the head with a zucchini.

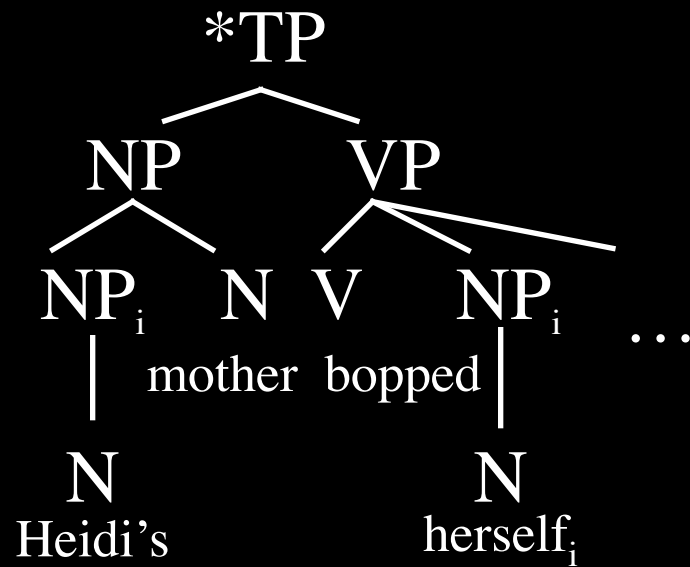
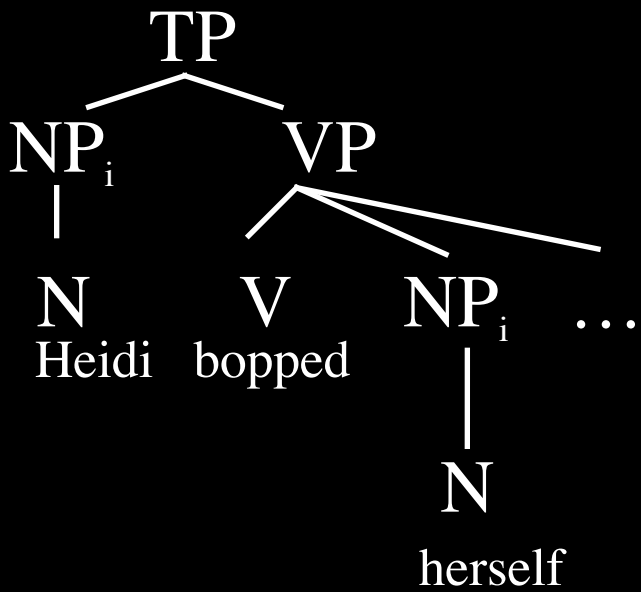
The antecedent for an anaphor can be the subject of the sentence, but not an NP inside the subject.

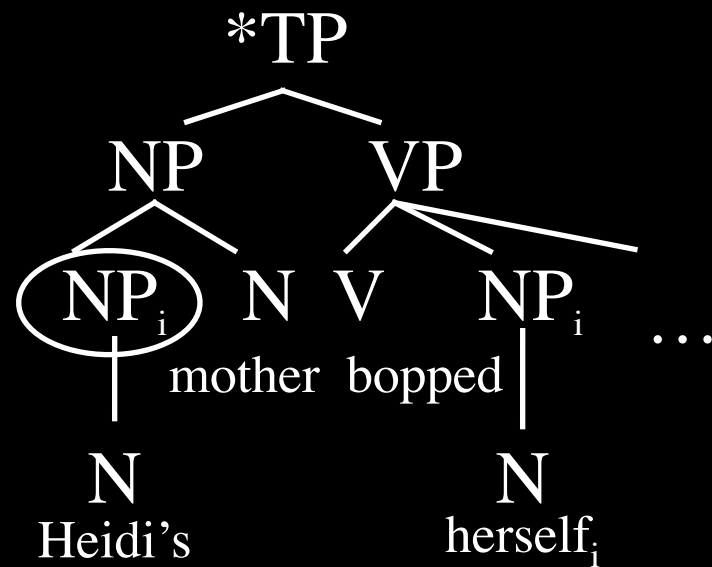
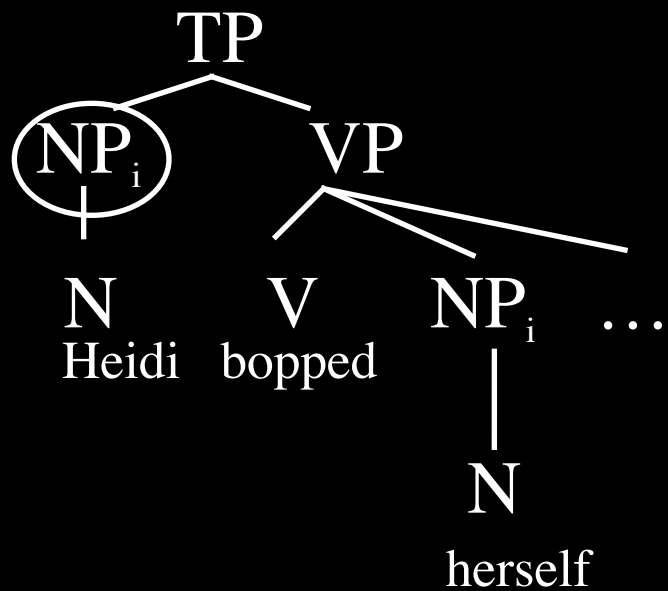
# Syntactic Restrictions on Anaphors

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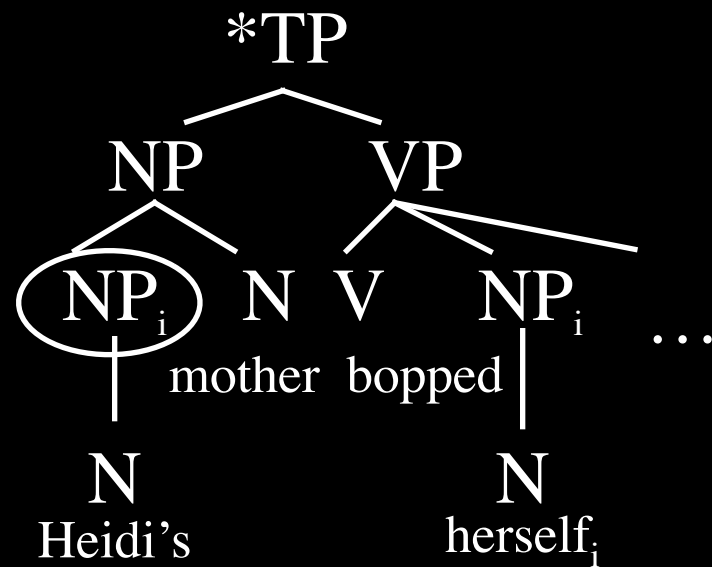
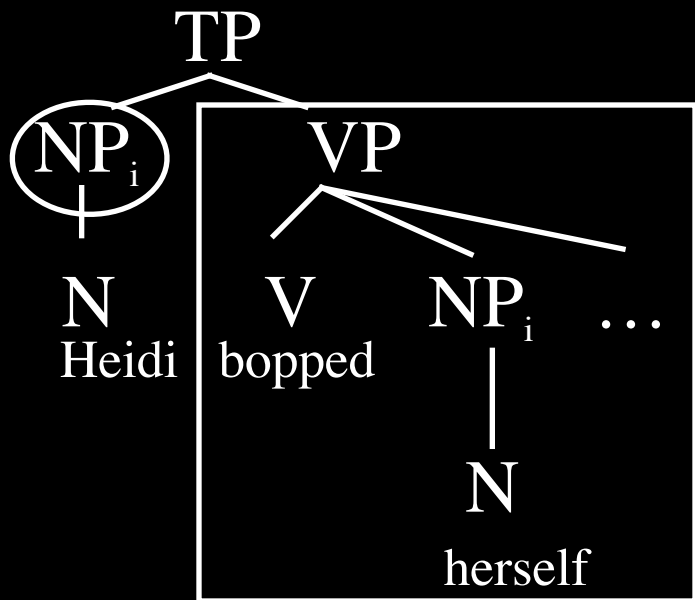
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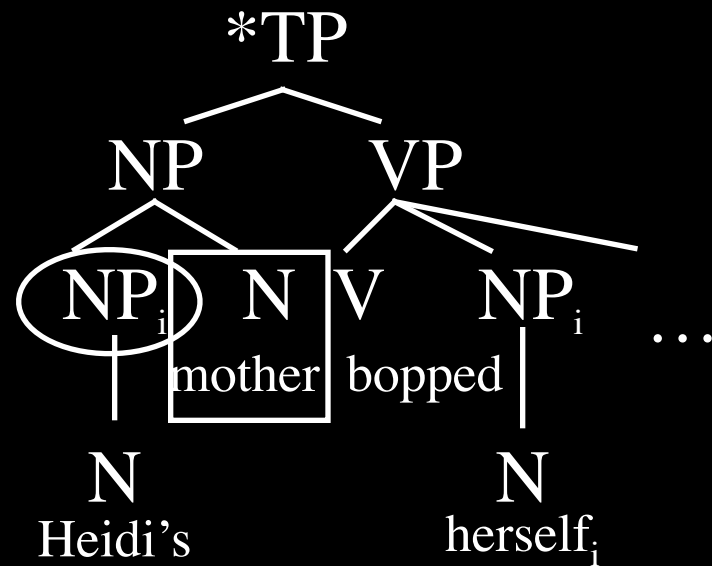
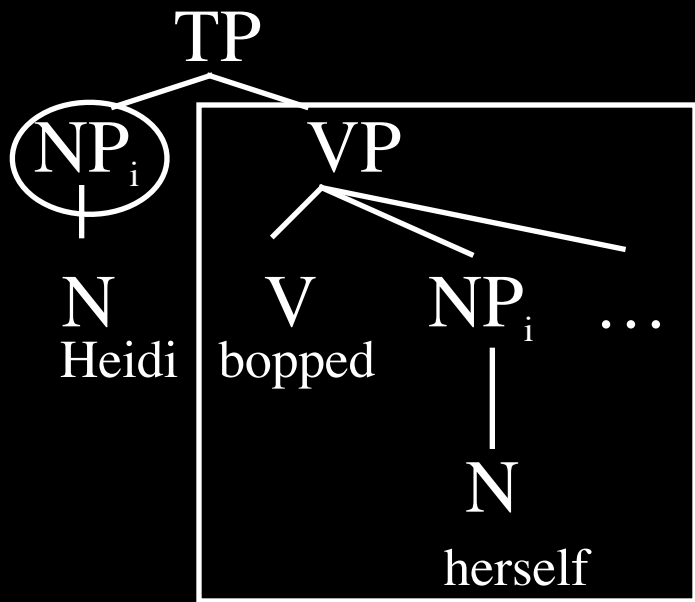
let's look at this distinction in terms of structural relations

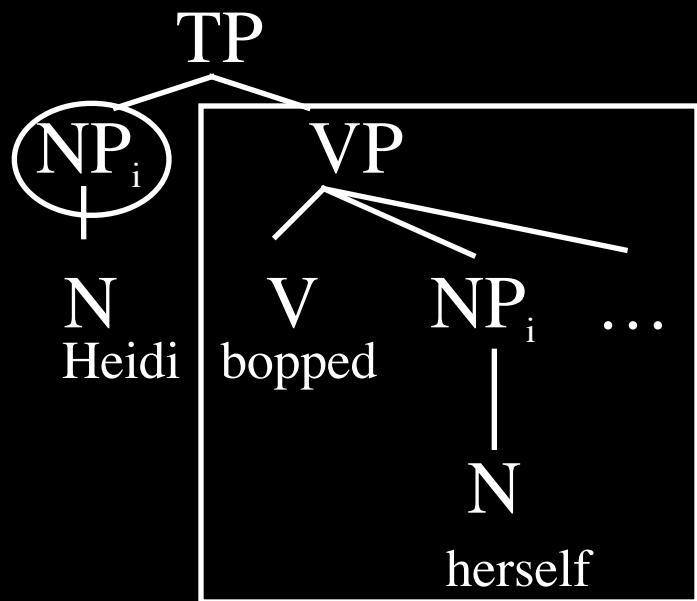




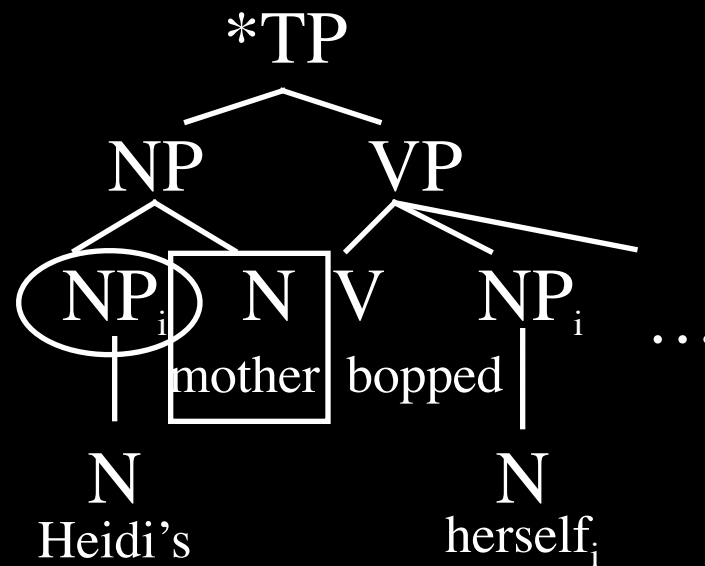


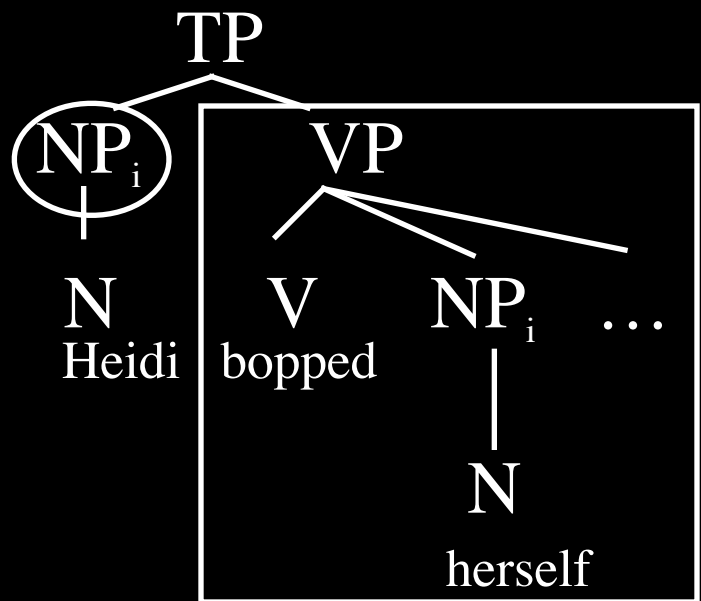




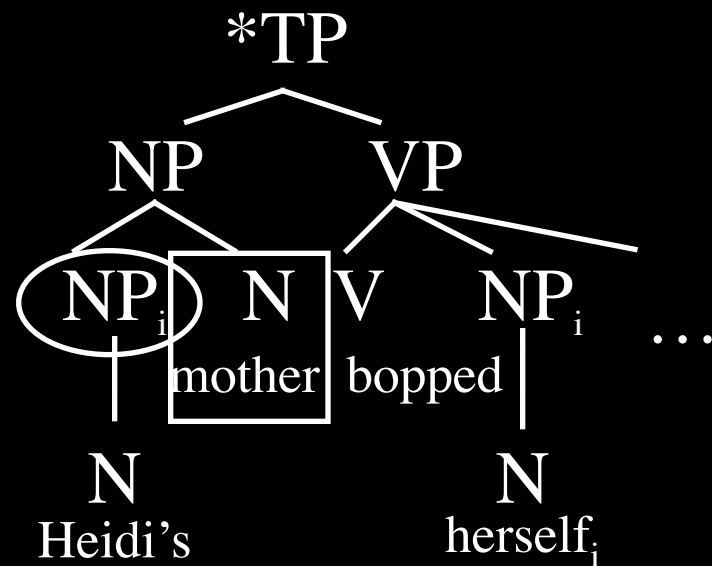


C-commanded by  
[<sub>NP</sub>Heidi]





C-commanded by  
[<sub>NP</sub>Heidi]



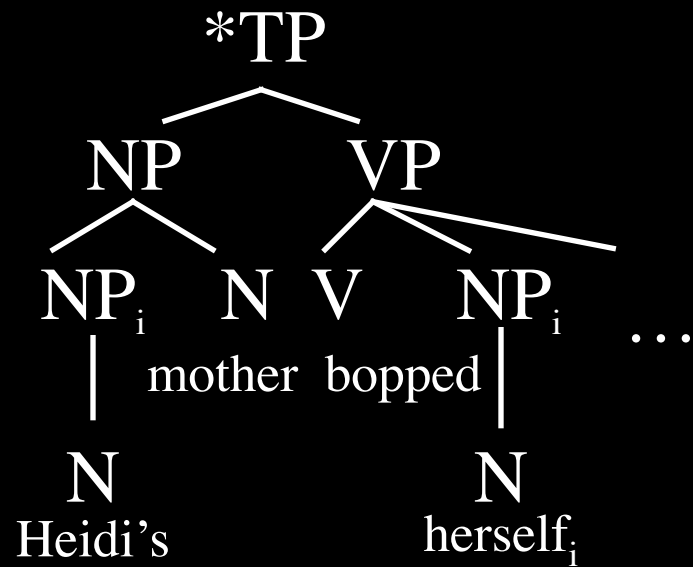
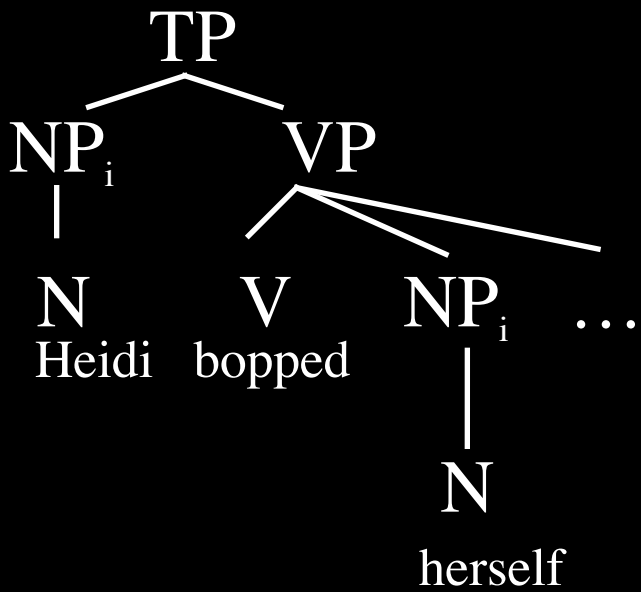
Not C-commanded by  
[<sub>NP</sub>Heidi]

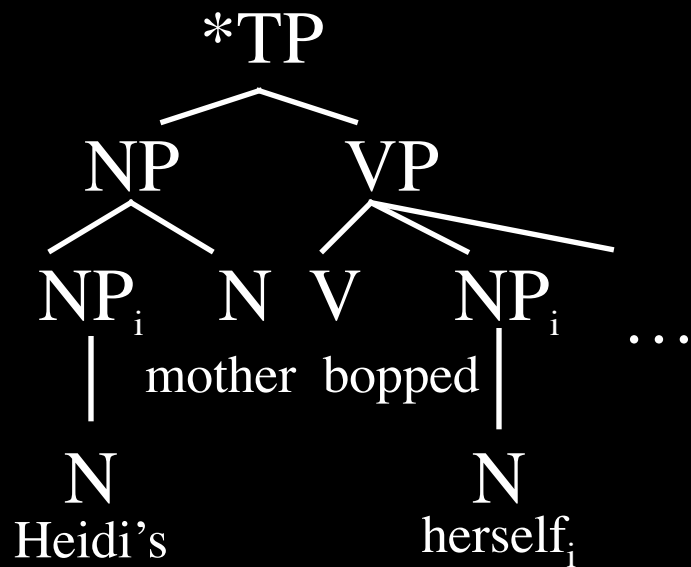
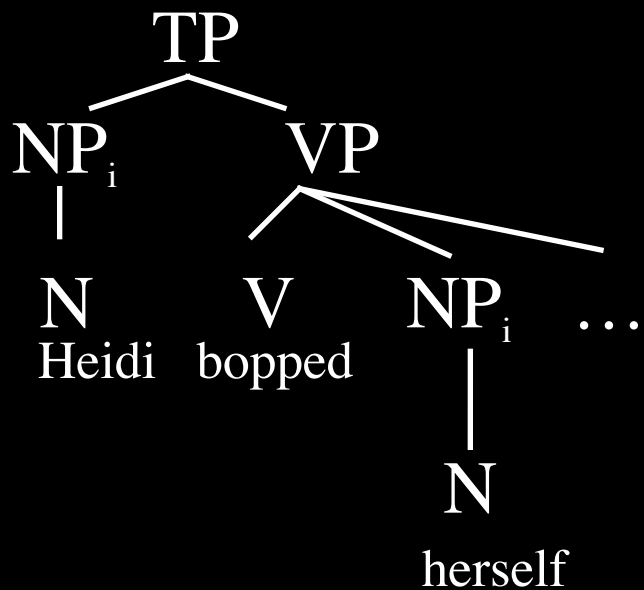
# Binding

- This fact is captured by binding.
- A **binds** B if and only if
  - A c-commands B AND
  - A and B are co-indexed.
- *Note: binding is not the same as co-indexing!!! (co-indexing has same index; binding requires a c-command relationship between the co-indexed elements.)*
- Binding is a SPECIAL kind of c-command. It is c-command with co-indexing.

# The Principle that deals with anaphors

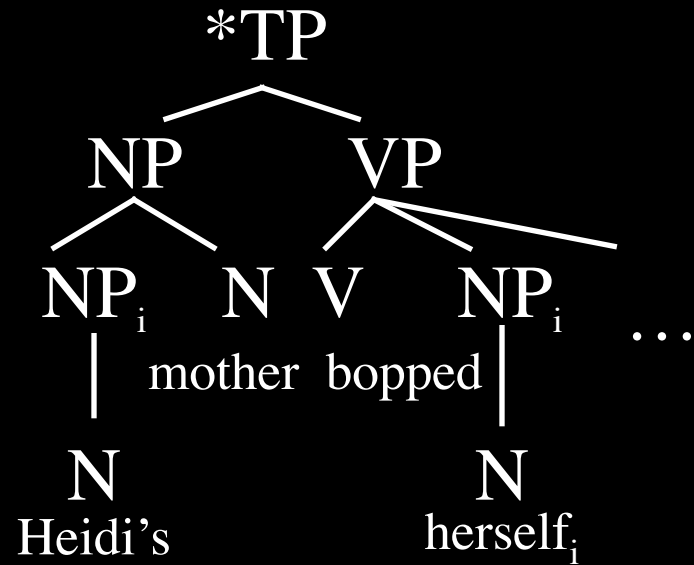
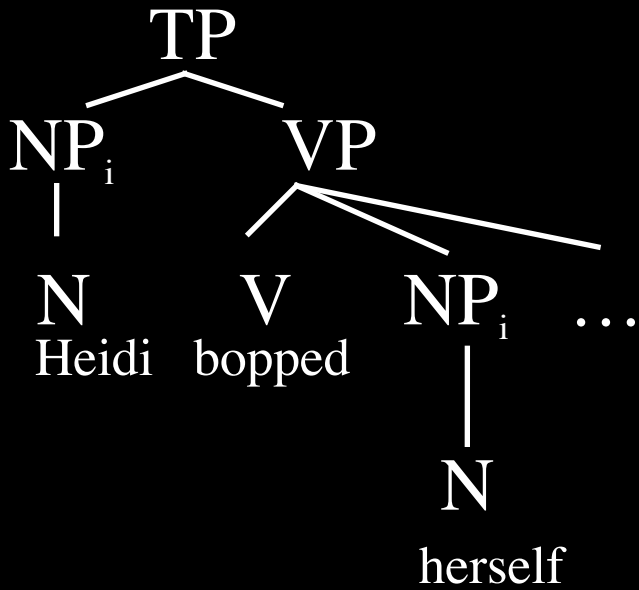
- **Principle A** (to be revised): An anaphor must be bound
- In other words: An anaphor must be c-commanded and co-indexed by an antecedent.



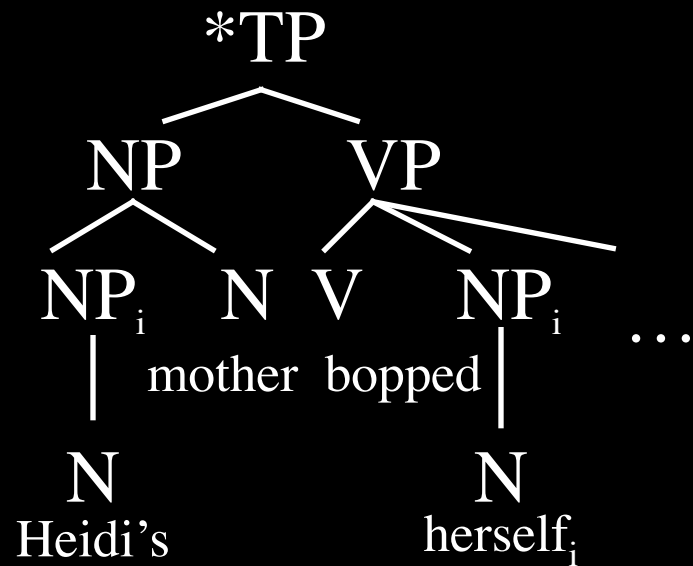
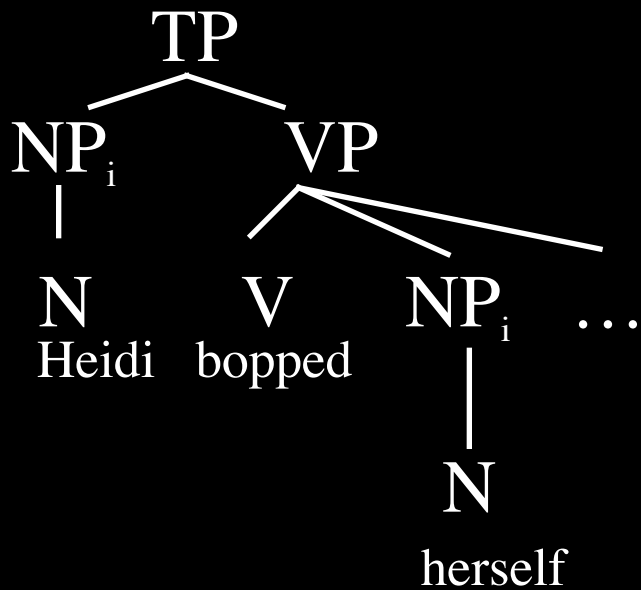


Coindexed?



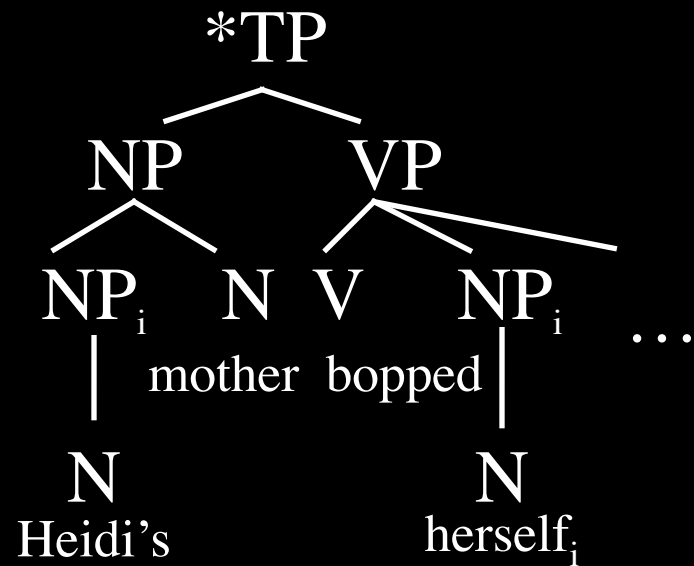
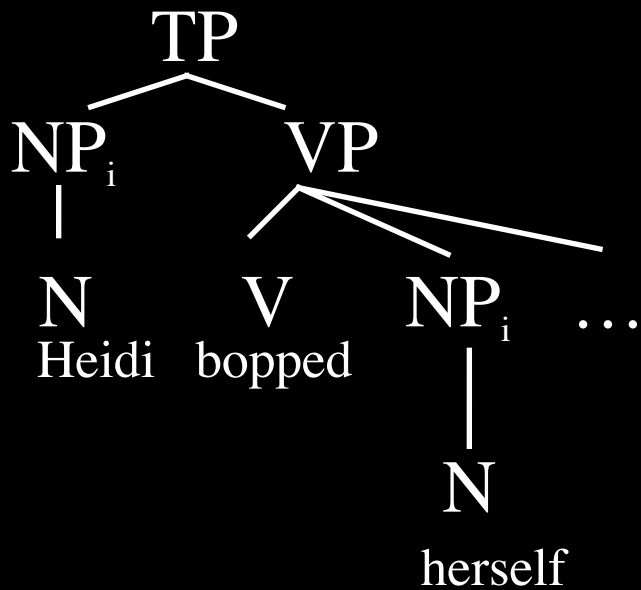


Coindexed? **yes**



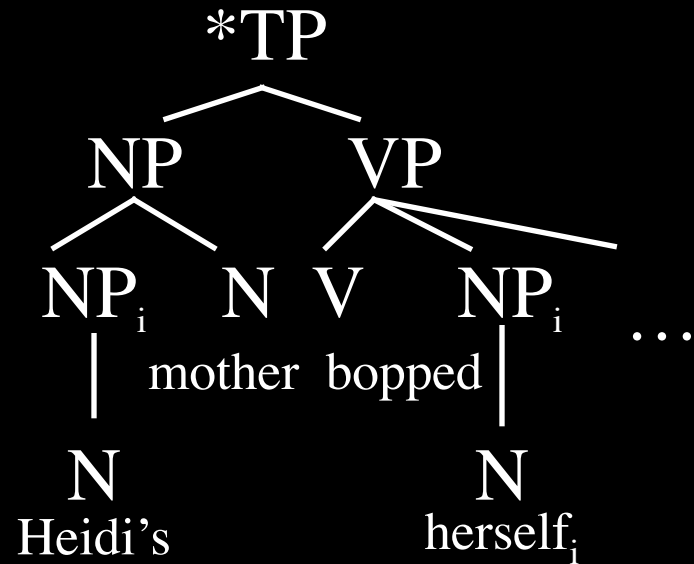
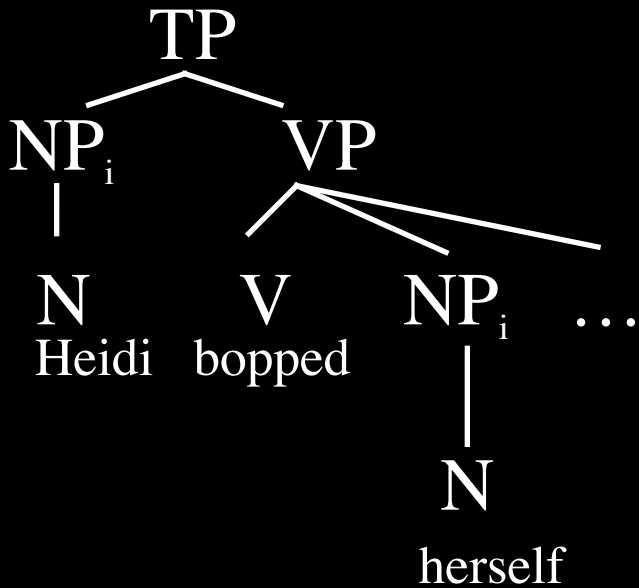
Coindexed? **yes**

C-command?



Coindexed?    **yes**

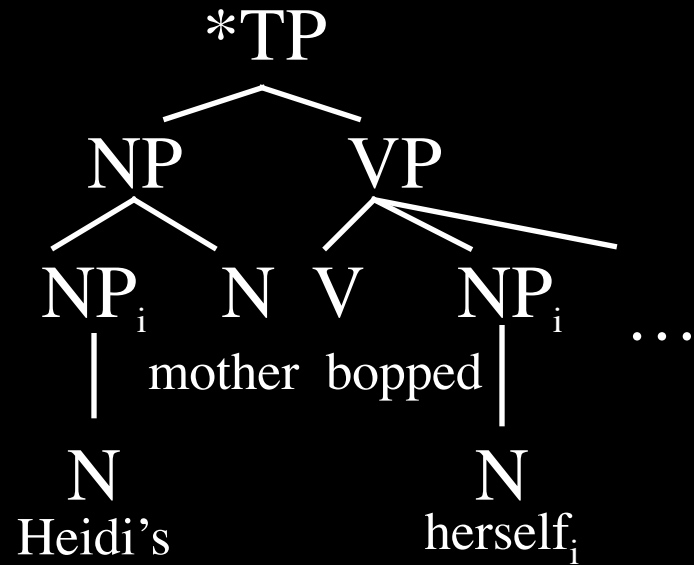
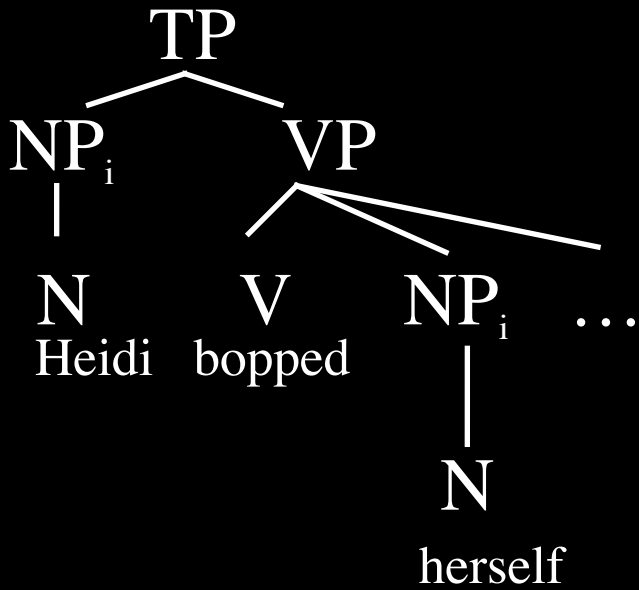
C-command?    **yes**



Coindexed?    **yes**

C-command?    **yes**

**∴ Bound**

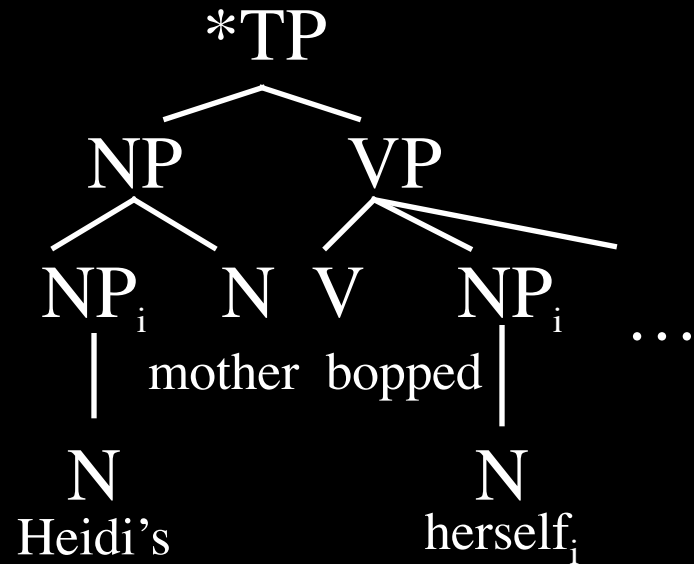
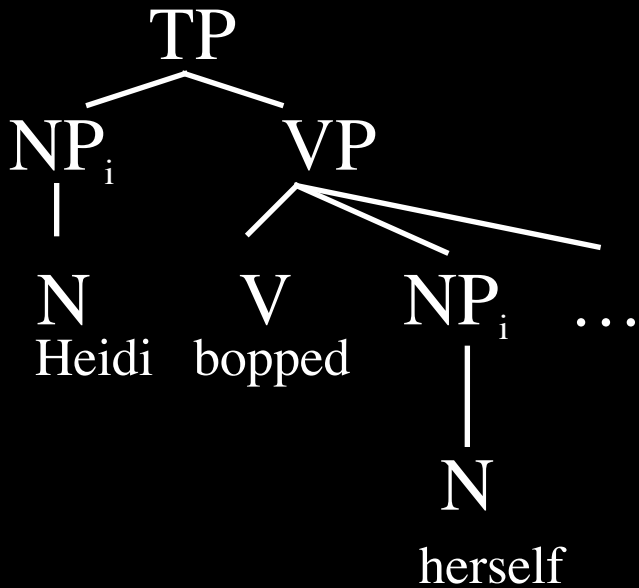


Coindexed? **yes**

Coindexed?

C-command? **yes**

**∴ Bound**

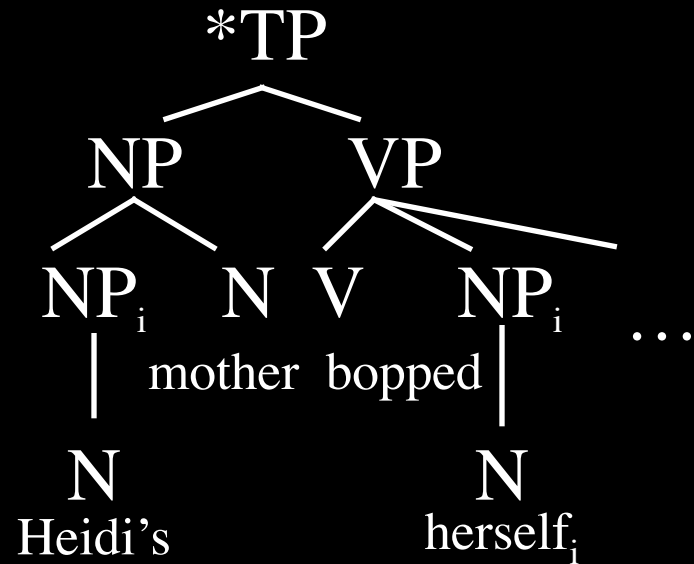
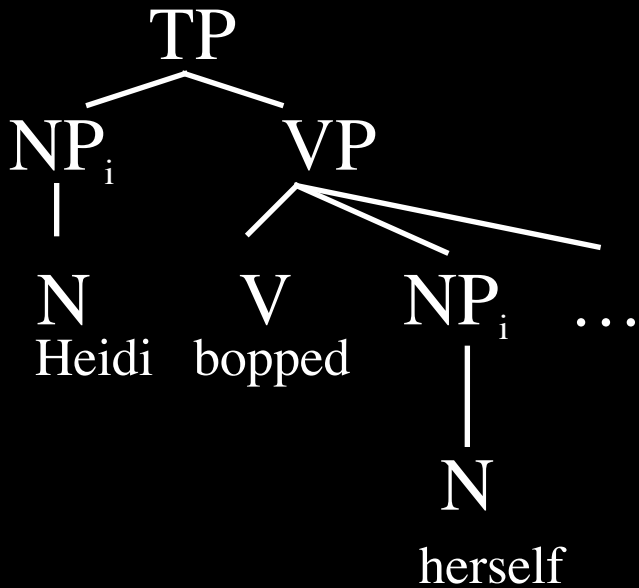


Coindexed? **yes**

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C-command? **yes**

**∴ Bound**



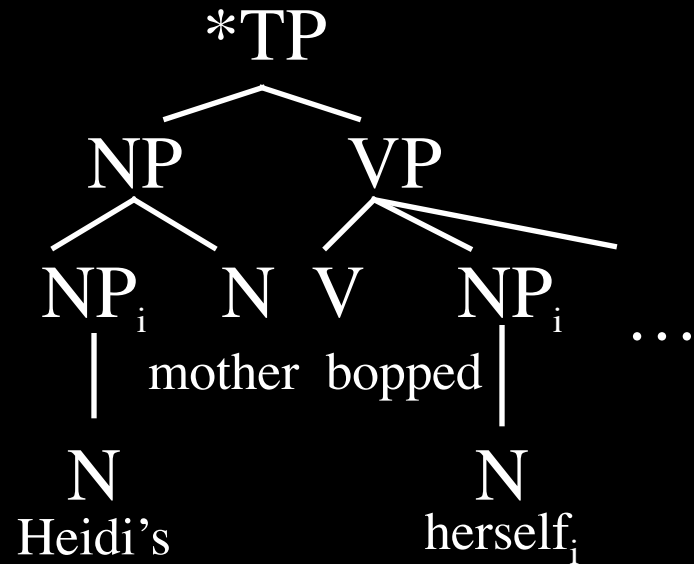
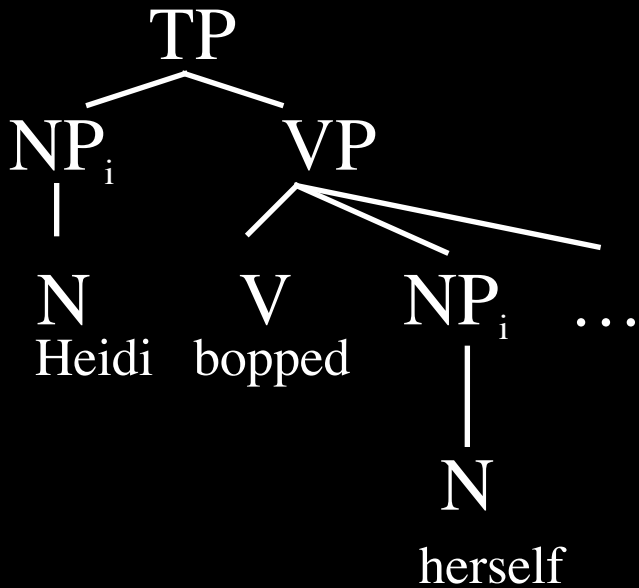
Coindexed? **yes**

C-command? **yes**

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Coindexed? **yes**

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Coindexed? **yes**

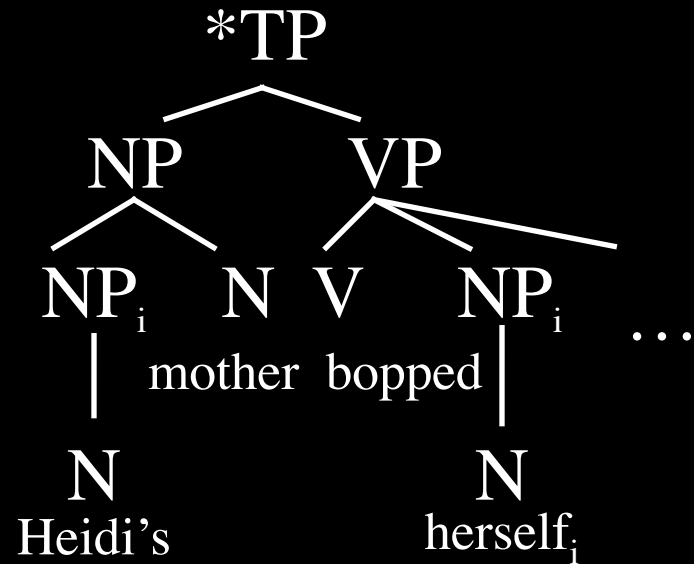
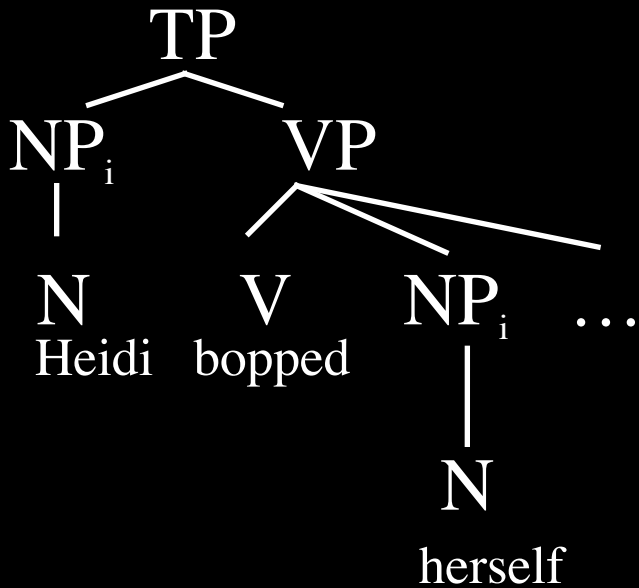
C-command? **yes**

**∴ Bound**

Coindexed? **yes**

C-command? **no**





Coindexed? **yes**

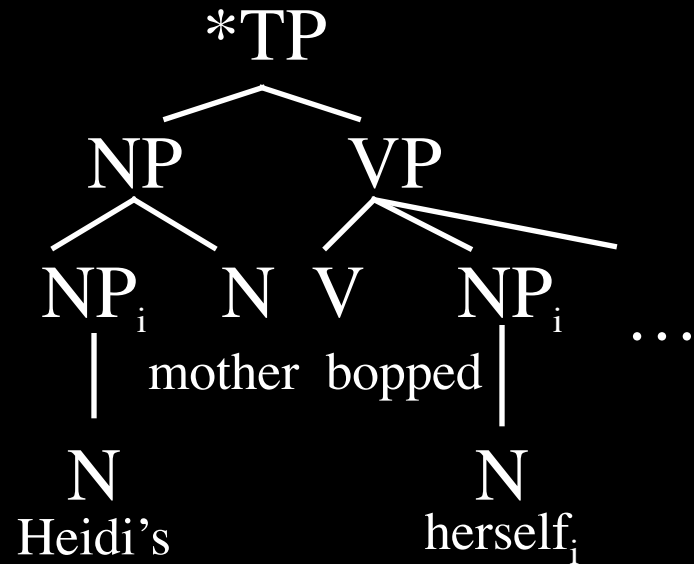
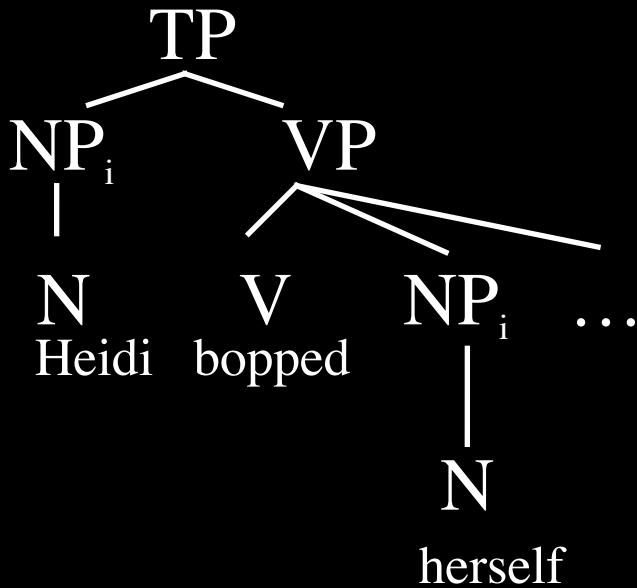
C-command? **yes**

**∴ Bound**

Coindexed? **yes**

C-command? **no**

**∴ NOT Bound**



Coindexed? **yes**

C-command? **yes**

**∴ Bound**

Coindexed? **yes**

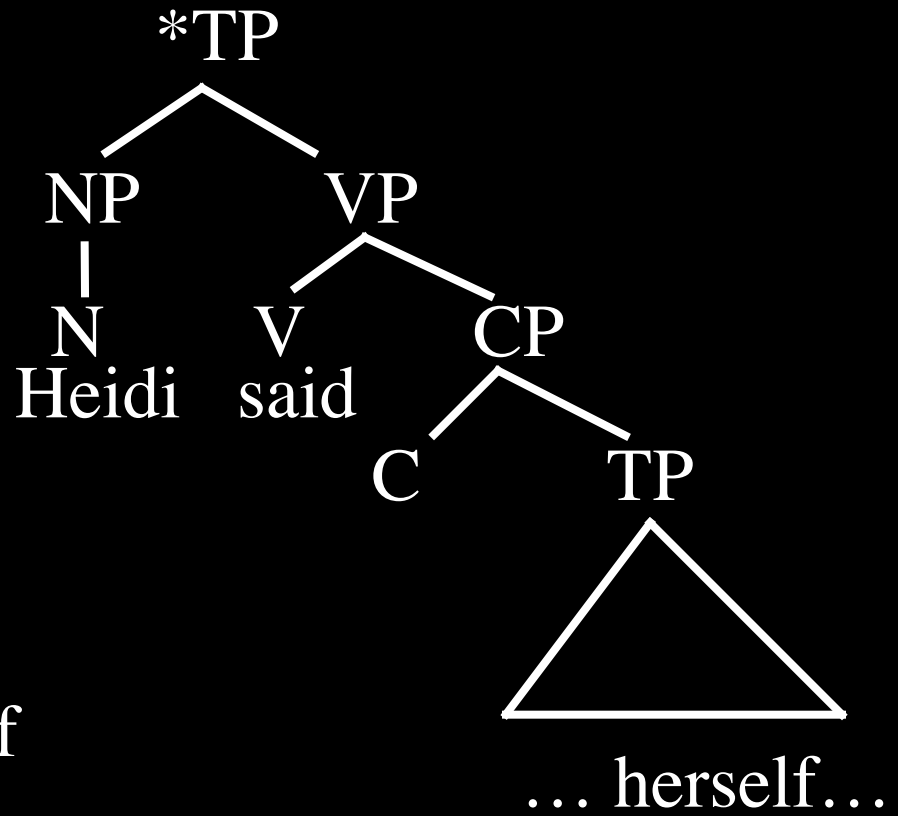
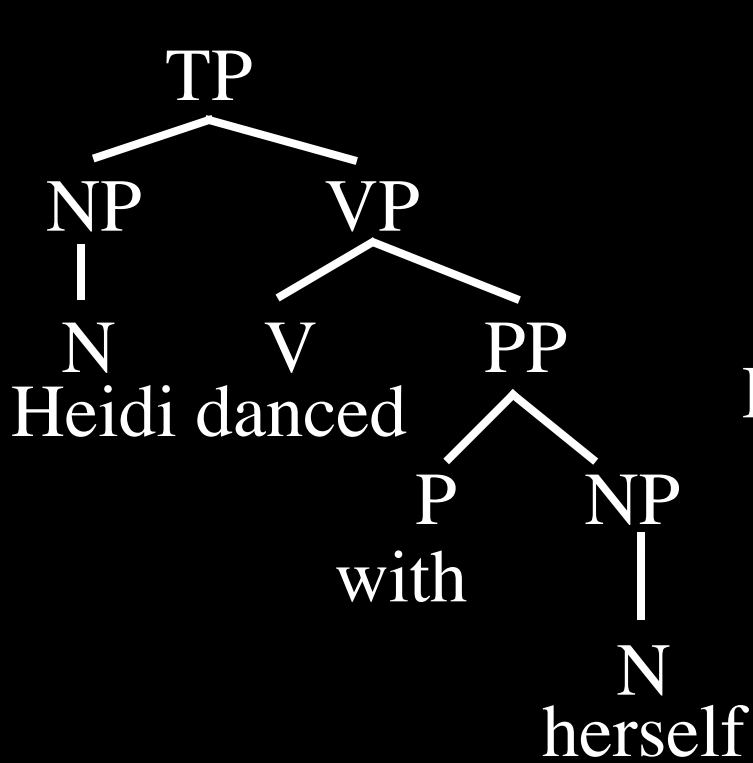
C-command? **no**

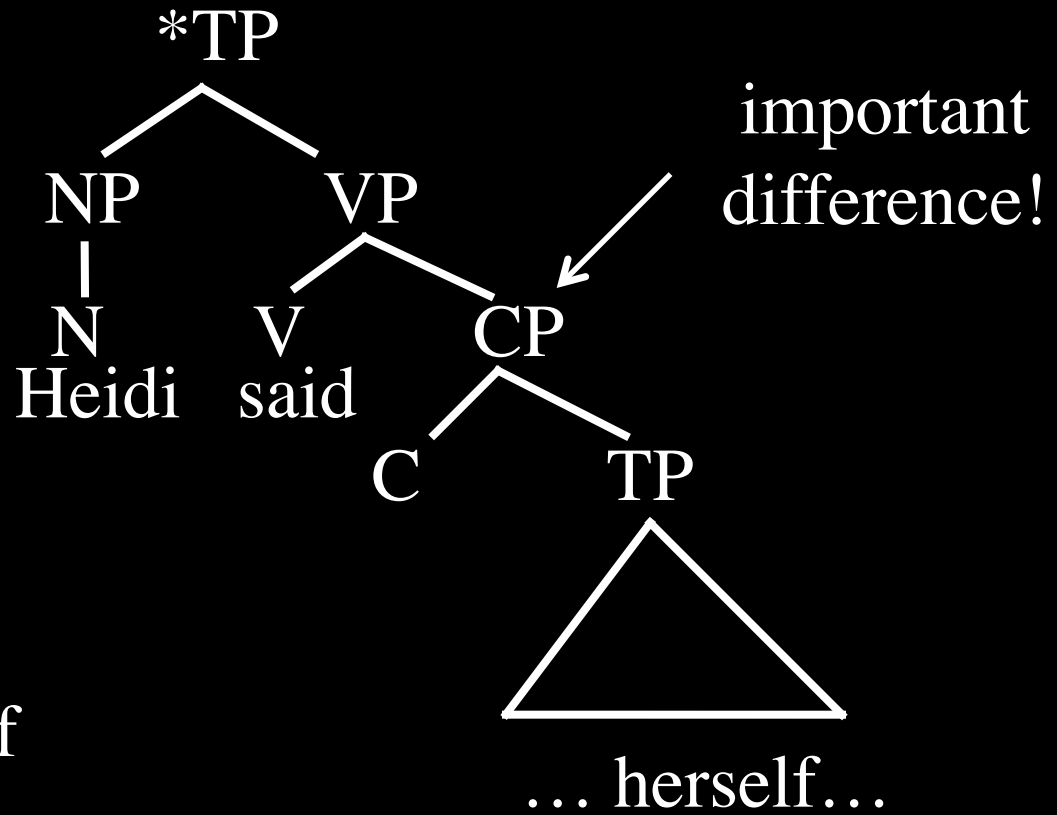
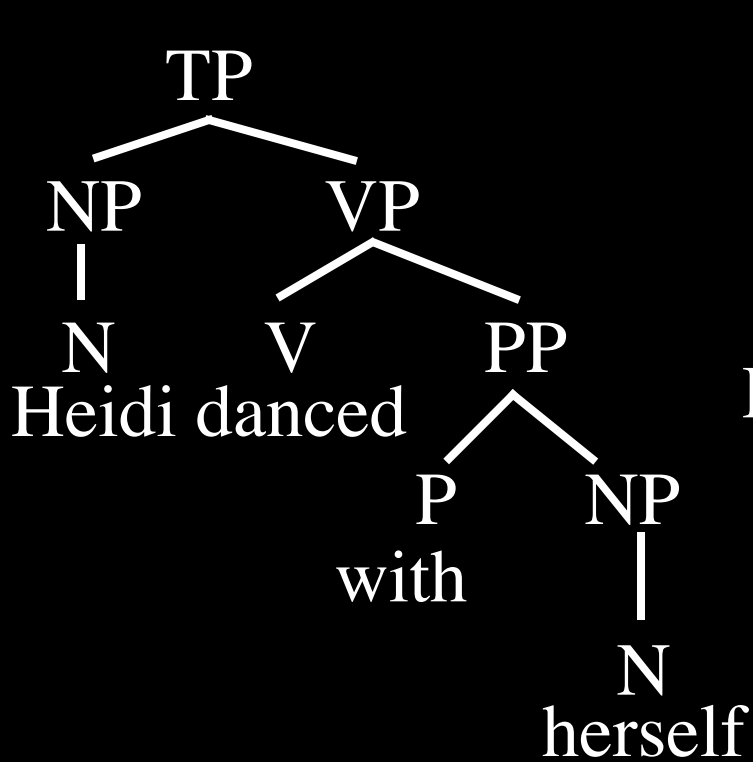
**∴ NOT Bound**

**VIOLATES PRINCIPLE A**

# Locality restrictions on anaphor binding

- Heidi<sub>i</sub> danced with herself<sub>i</sub>
- \*Heidi<sub>i</sub> said that Art danced with herself<sub>i</sub>
  - (cf. Heidi<sub>i</sub> said that Art danced with her<sub>i</sub>.)
- \*Heidi<sub>i</sub> said that herself<sub>i</sub> danced with Art
  - (cf. Heidi<sub>i</sub> said that she<sub>i</sub> danced with Art)

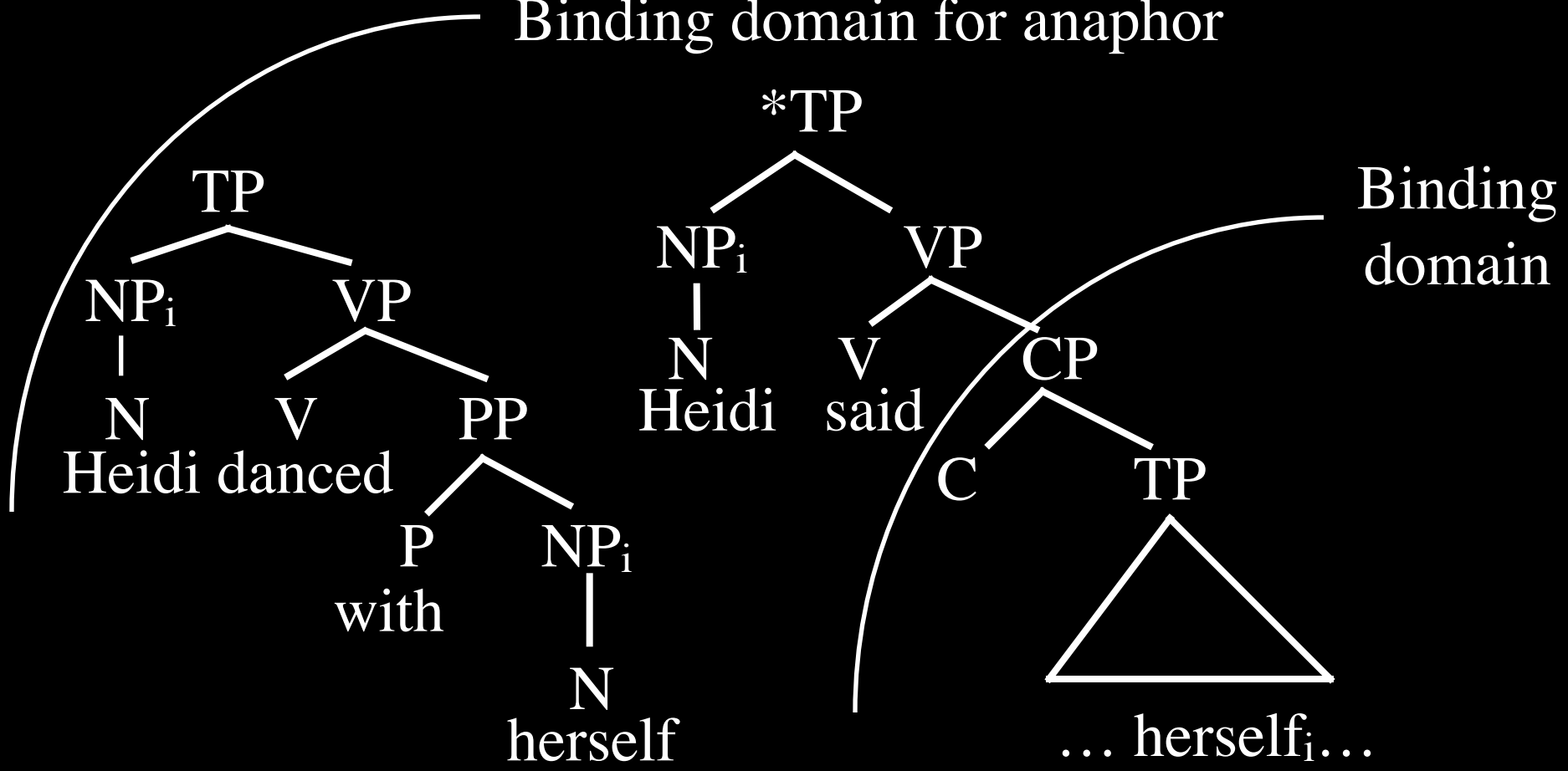




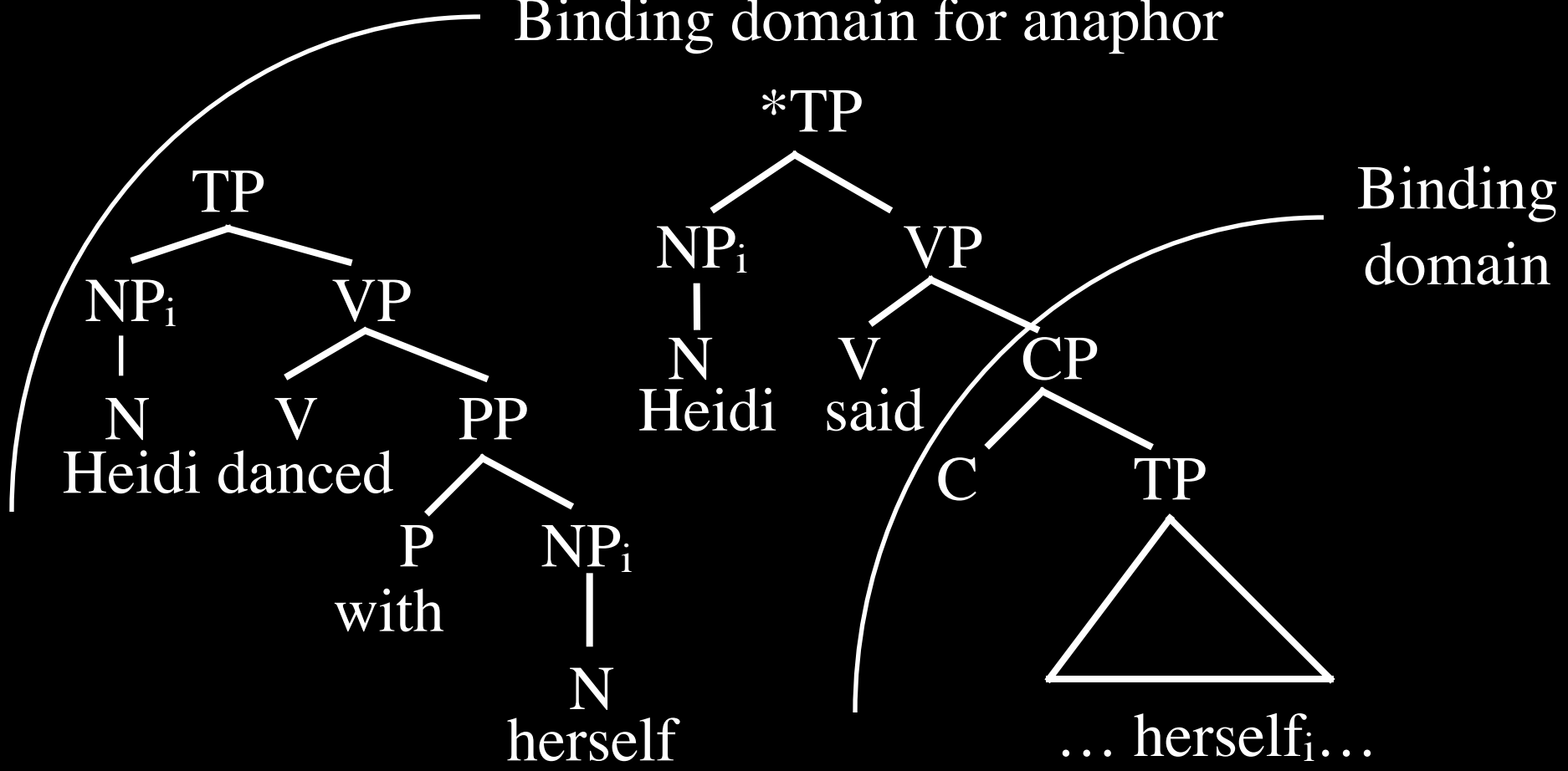
# Binding domain

- **Binding domain:** The clause containing the anaphor
- This definition is overly simplistic; We'll talk about this later in the semester, but the above will be your definition for the purposes of homework for now
- **Binding Principle A:** An anaphor must be bound in its binding domain.

# Binding domain for anaphor



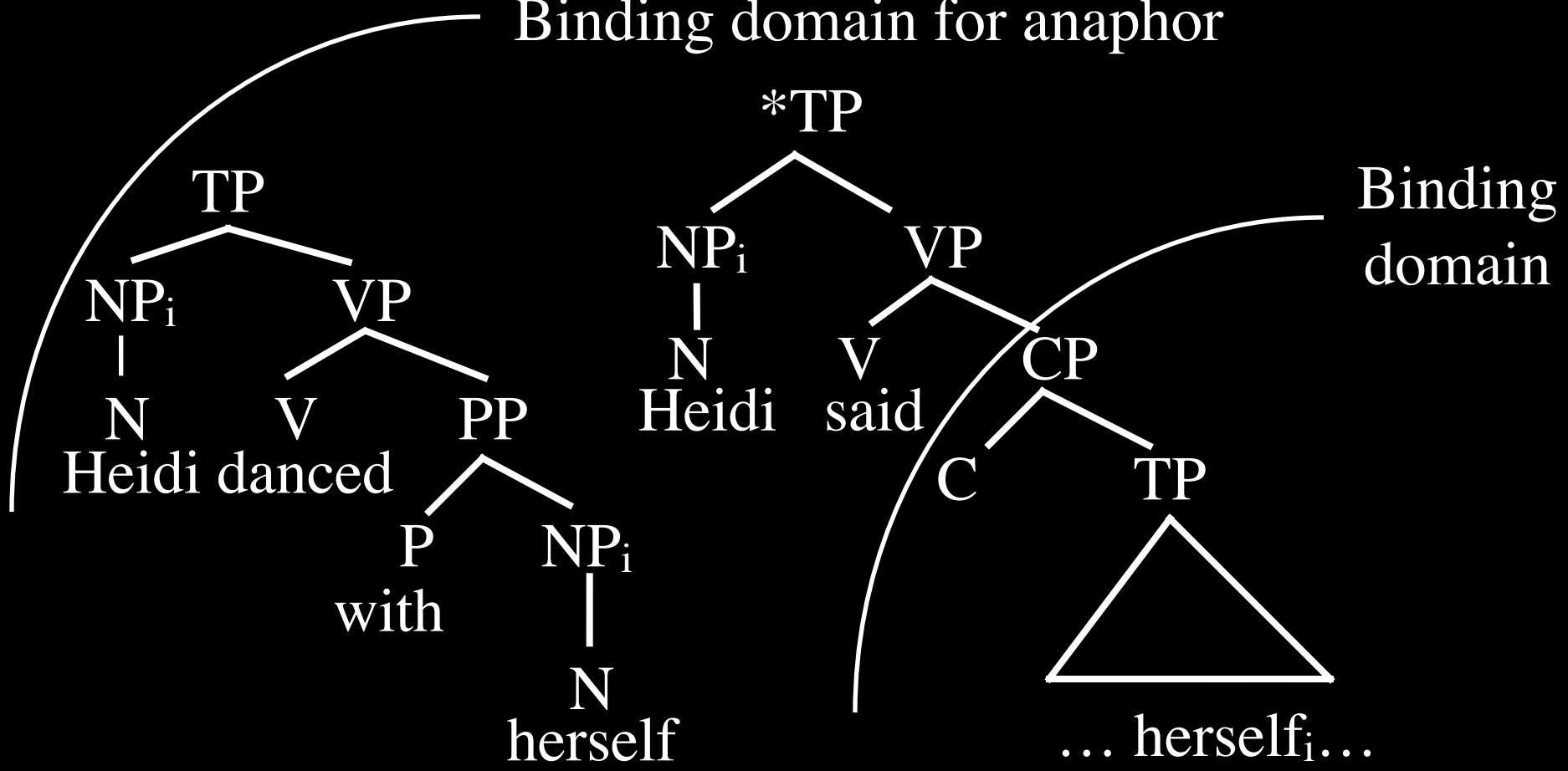
Binding domain for anaphor



Coindexed?

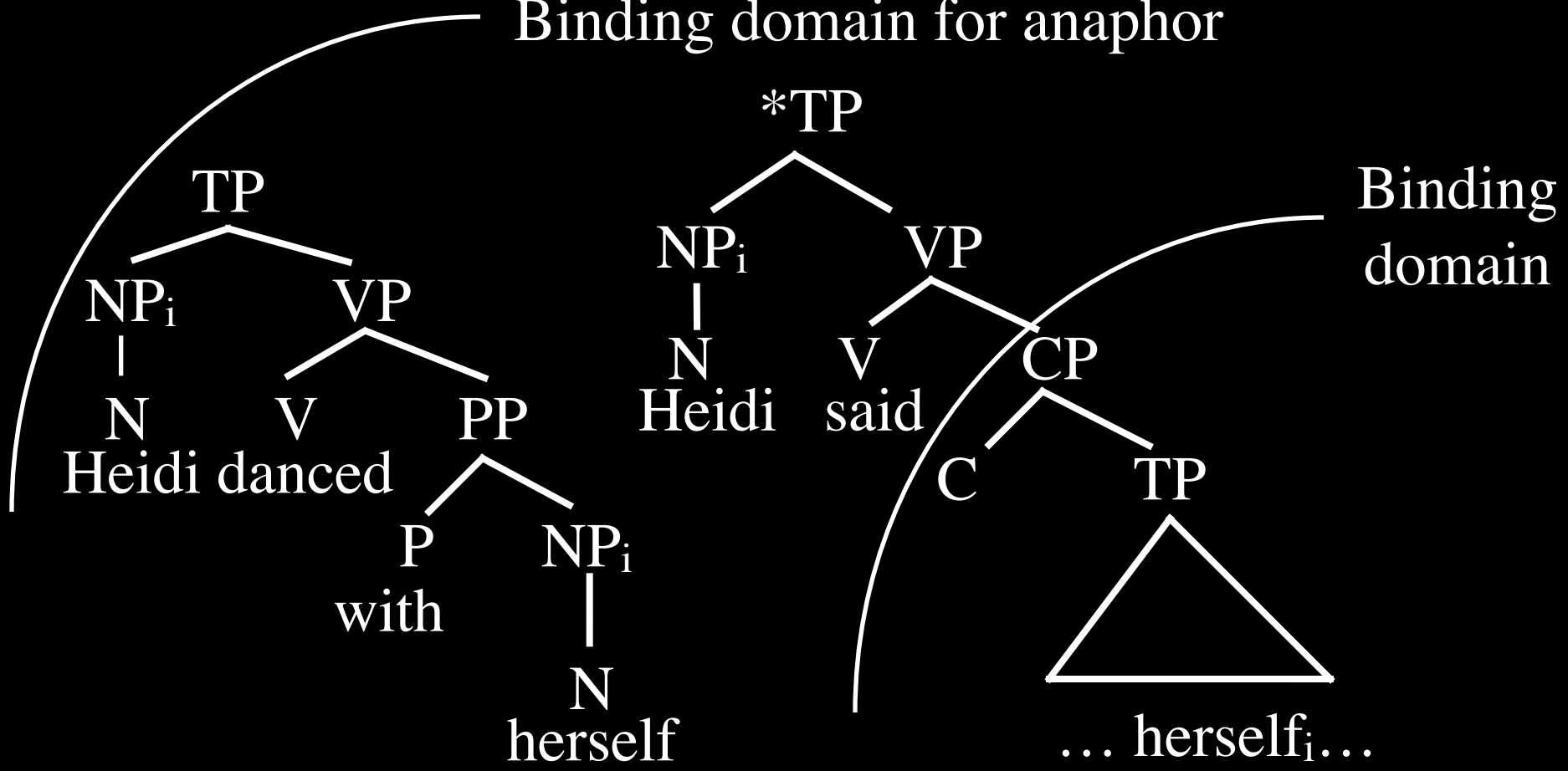


# Binding domain for anaphor



Coindexed? **yes**

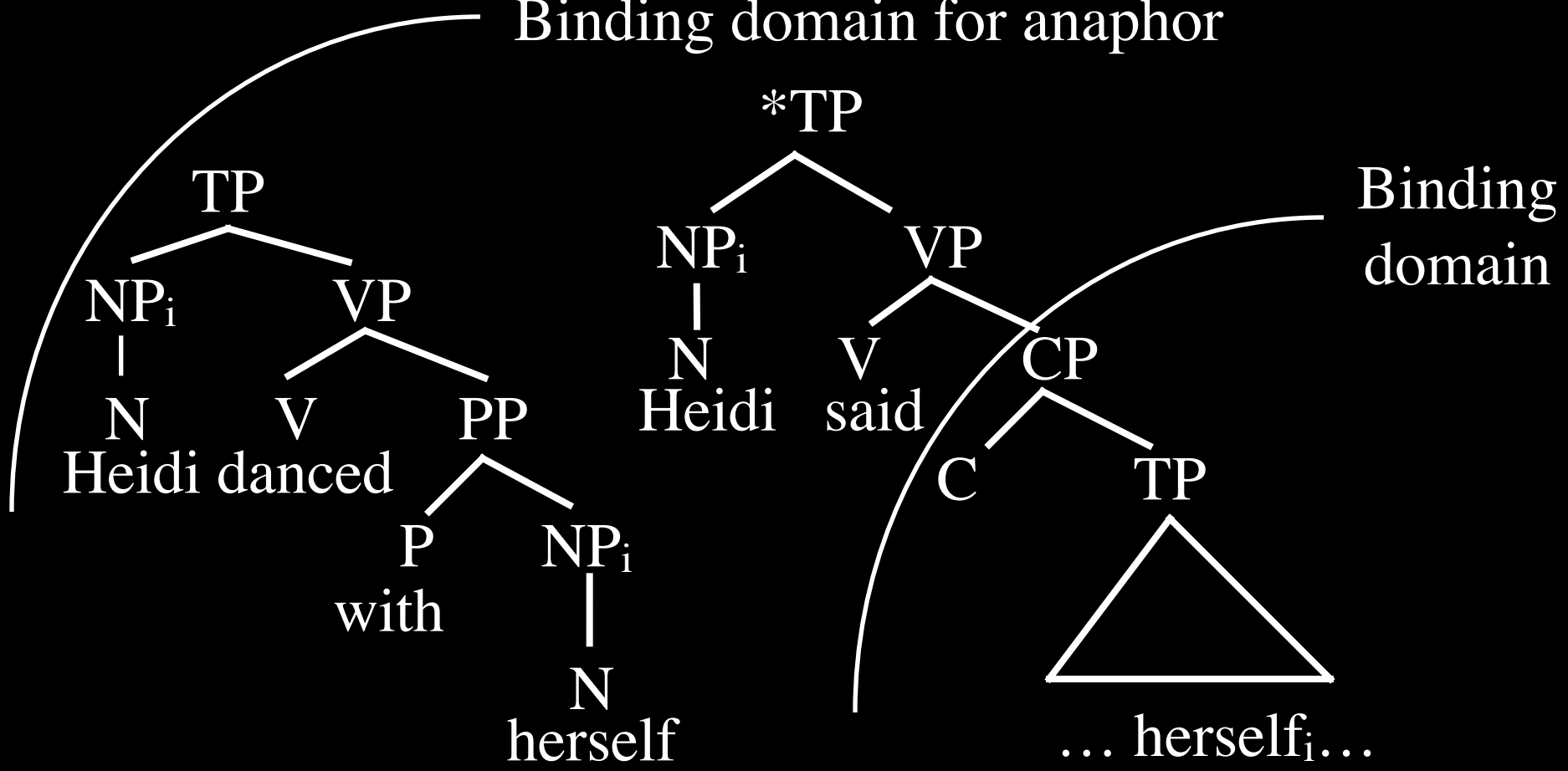
# Binding domain for anaphor



Coindexed? **yes**

C-command?

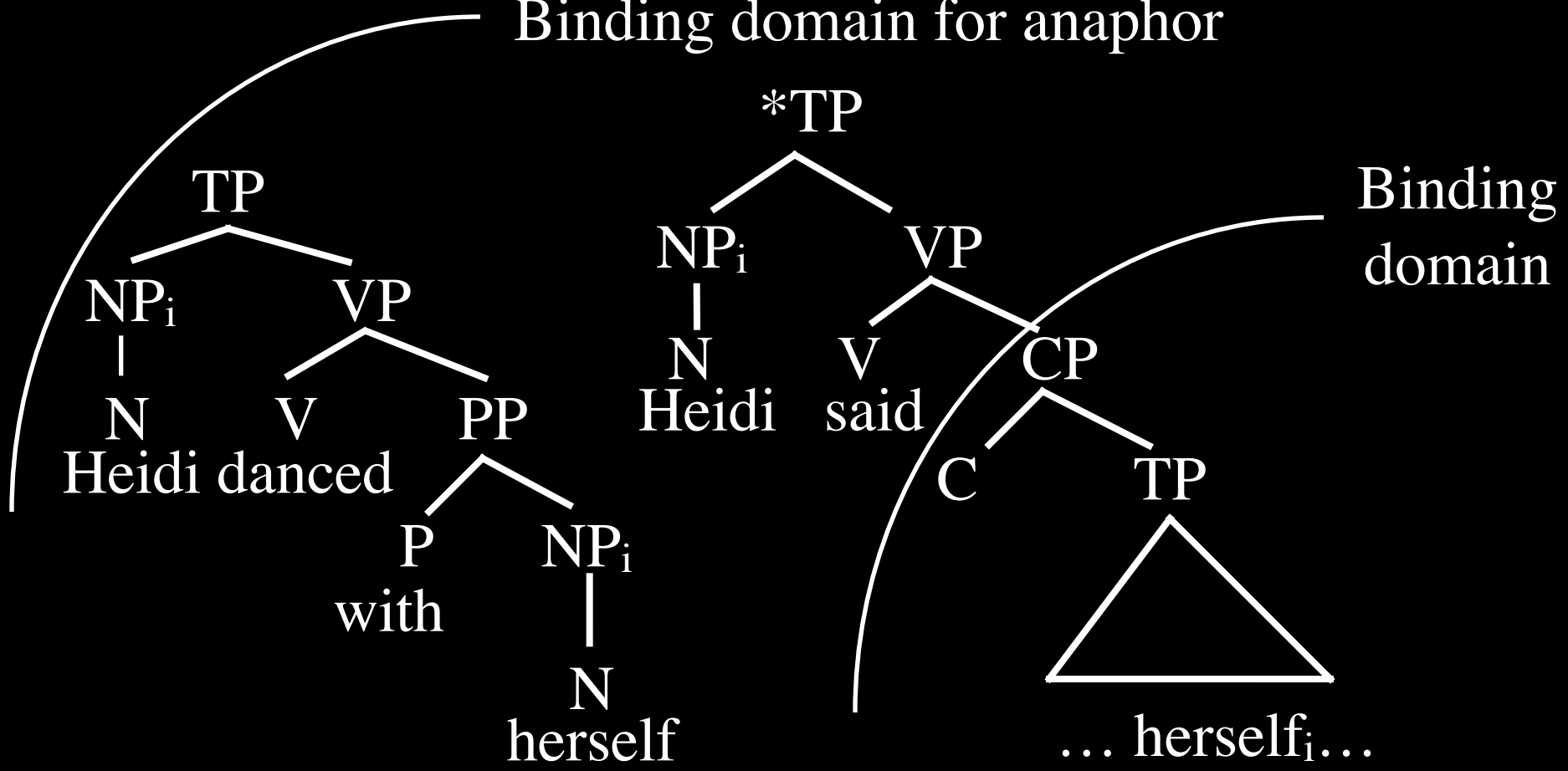
# Binding domain for anaphor



Coindexed? **yes**

C-command? **yes ∴ Bound**

# Binding domain for anaphor

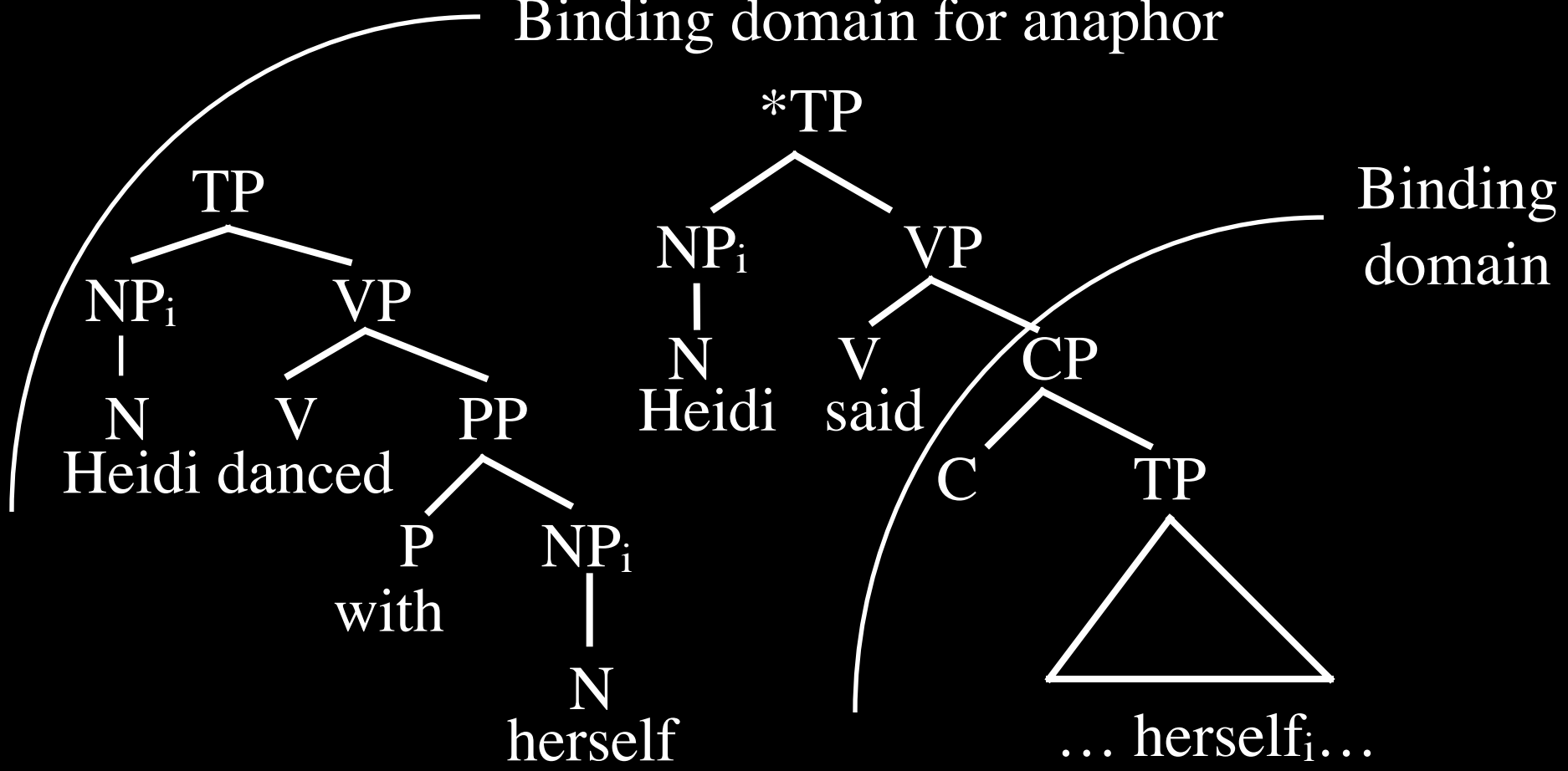


Coindexed? **yes**

C-command? **yes ∴ Bound**

Bound in domain?

# Binding domain for anaphor

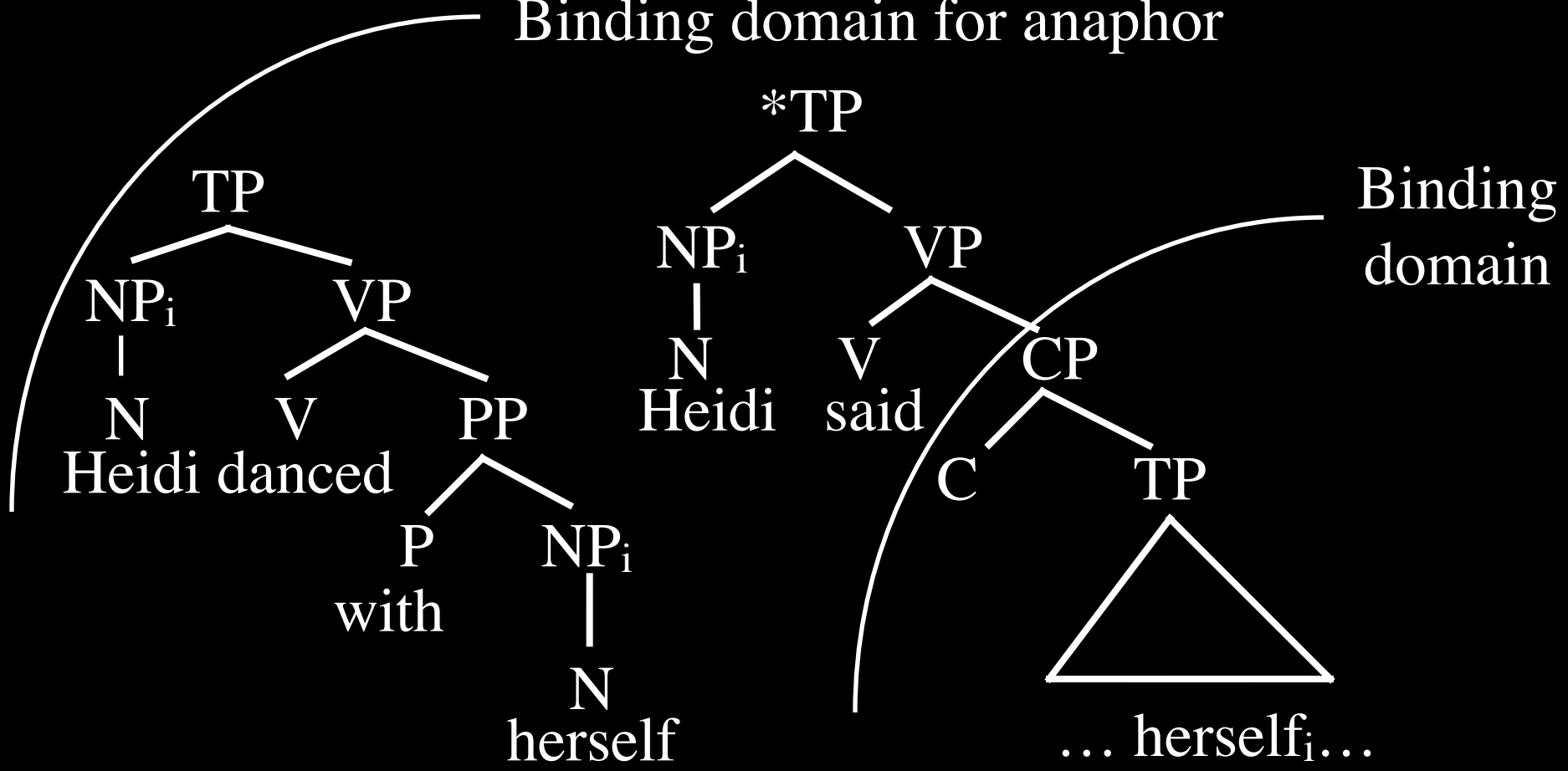


Coindexed? **yes**

C-command? **yes ∴ Bound**

Bound in domain? **yes**

# Binding domain for anaphor



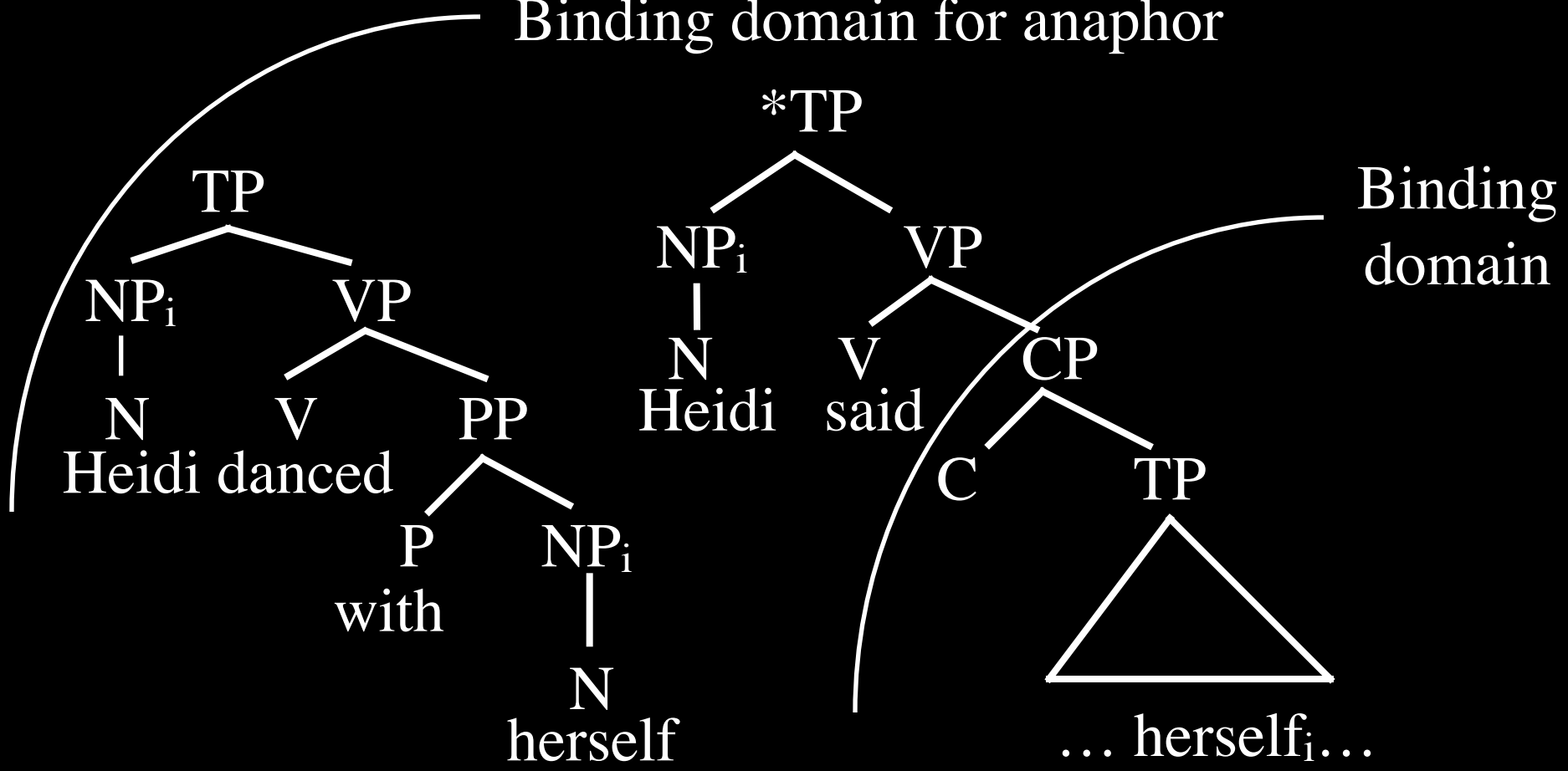
Coindexed? **yes**

Coindexed?

C-command? **yes ∴ Bound**

Bound in domain? **yes**

# Binding domain for anaphor



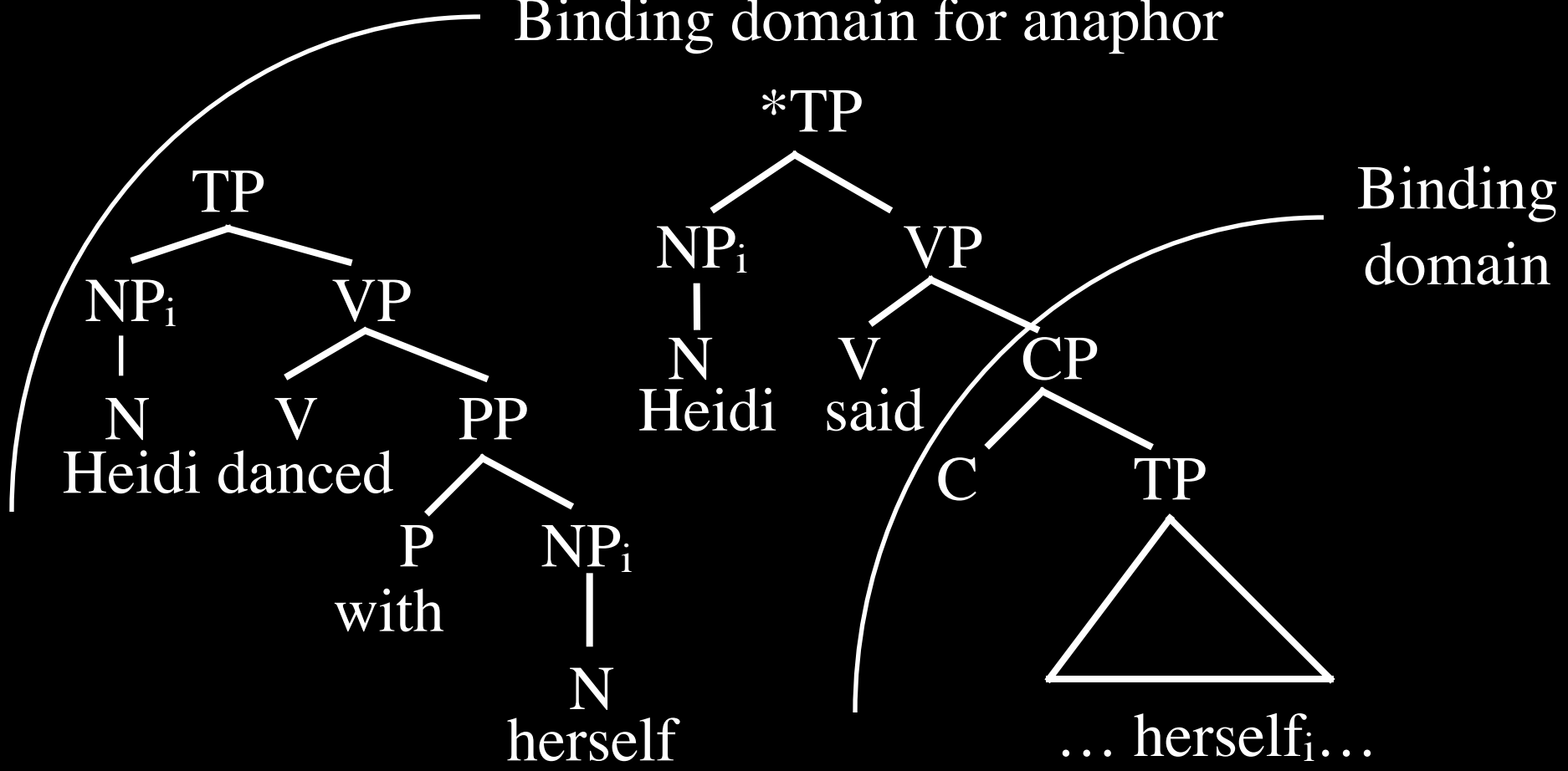
Coindexed? **yes**

Coindexed? **yes**

C-command? **yes** ∴ **Bound**

Bound in domain? **yes**

# Binding domain for anaphor



Coindexed? **yes**

Coindexed? **yes**

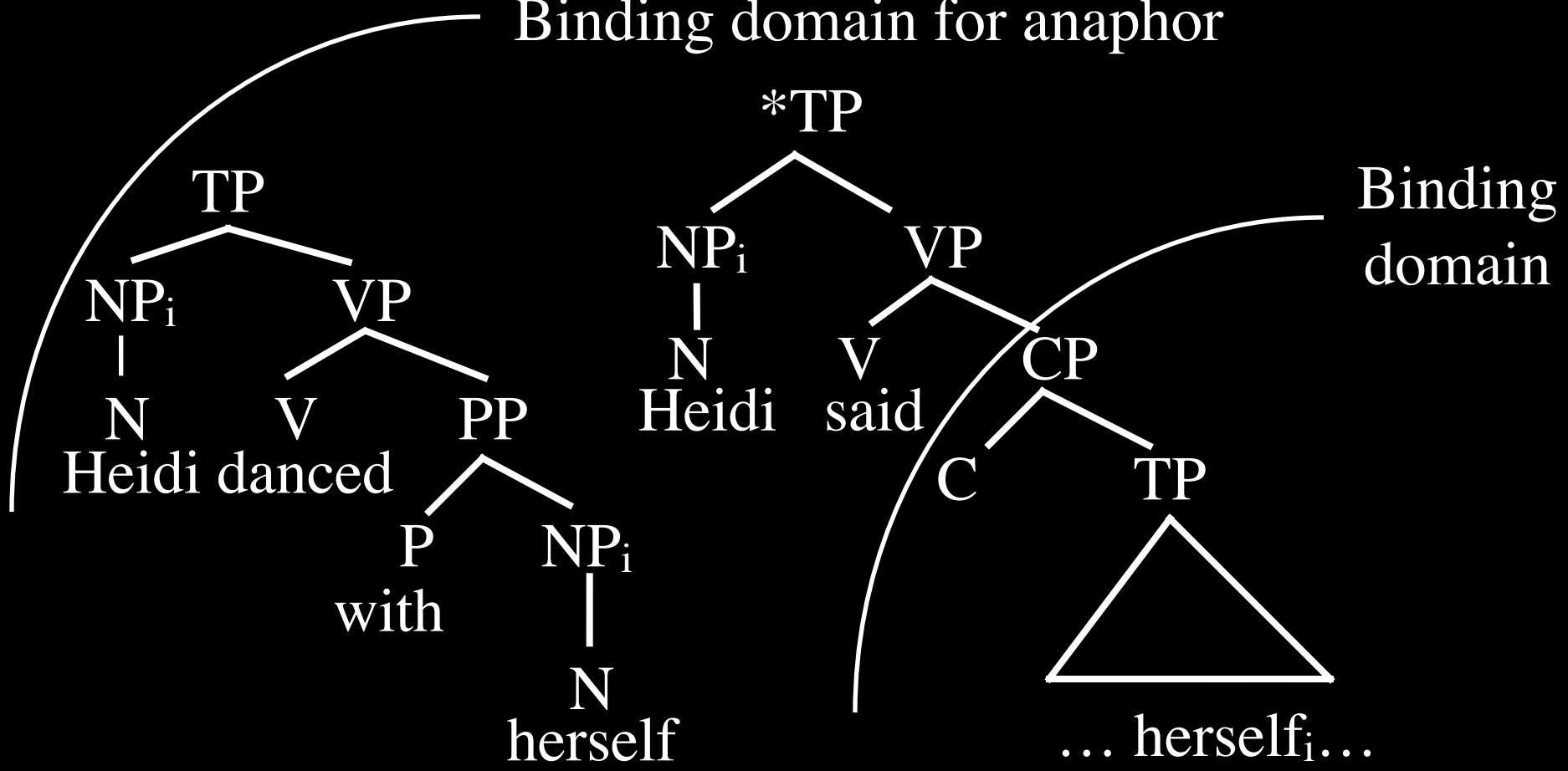
C-command? **yes** ∴ **Bound**

C-command?

Bound in domain? **yes**



# Binding domain for anaphor



Coindexed? **yes**

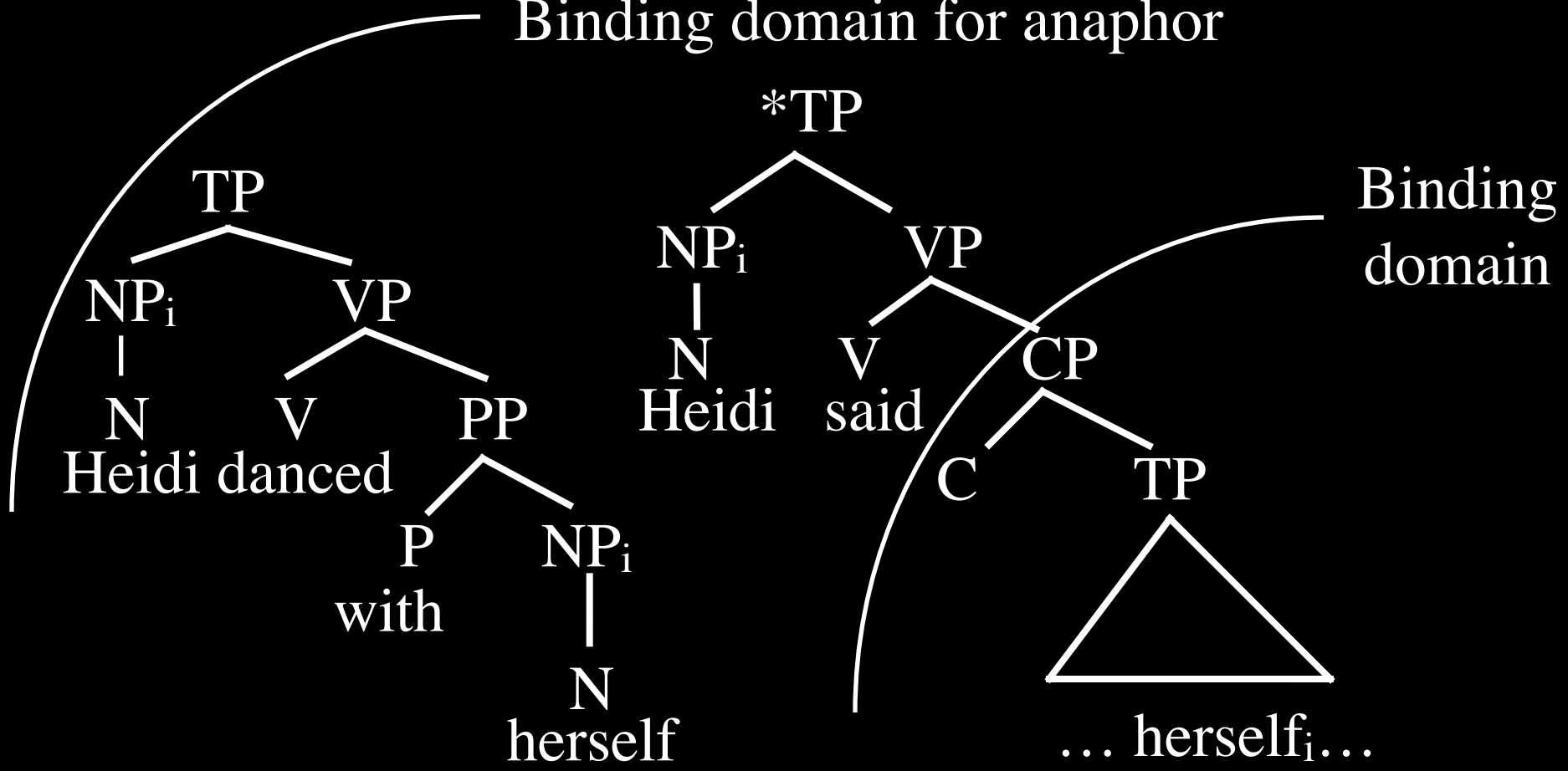
Coindexed? **yes**

C-command? **yes** ∴ **Bound**

C-command? **yes** ∴ **Bound**

Bound in domain? **yes**

# Binding domain for anaphor



Coindexed? **yes**

Coindexed? **yes**

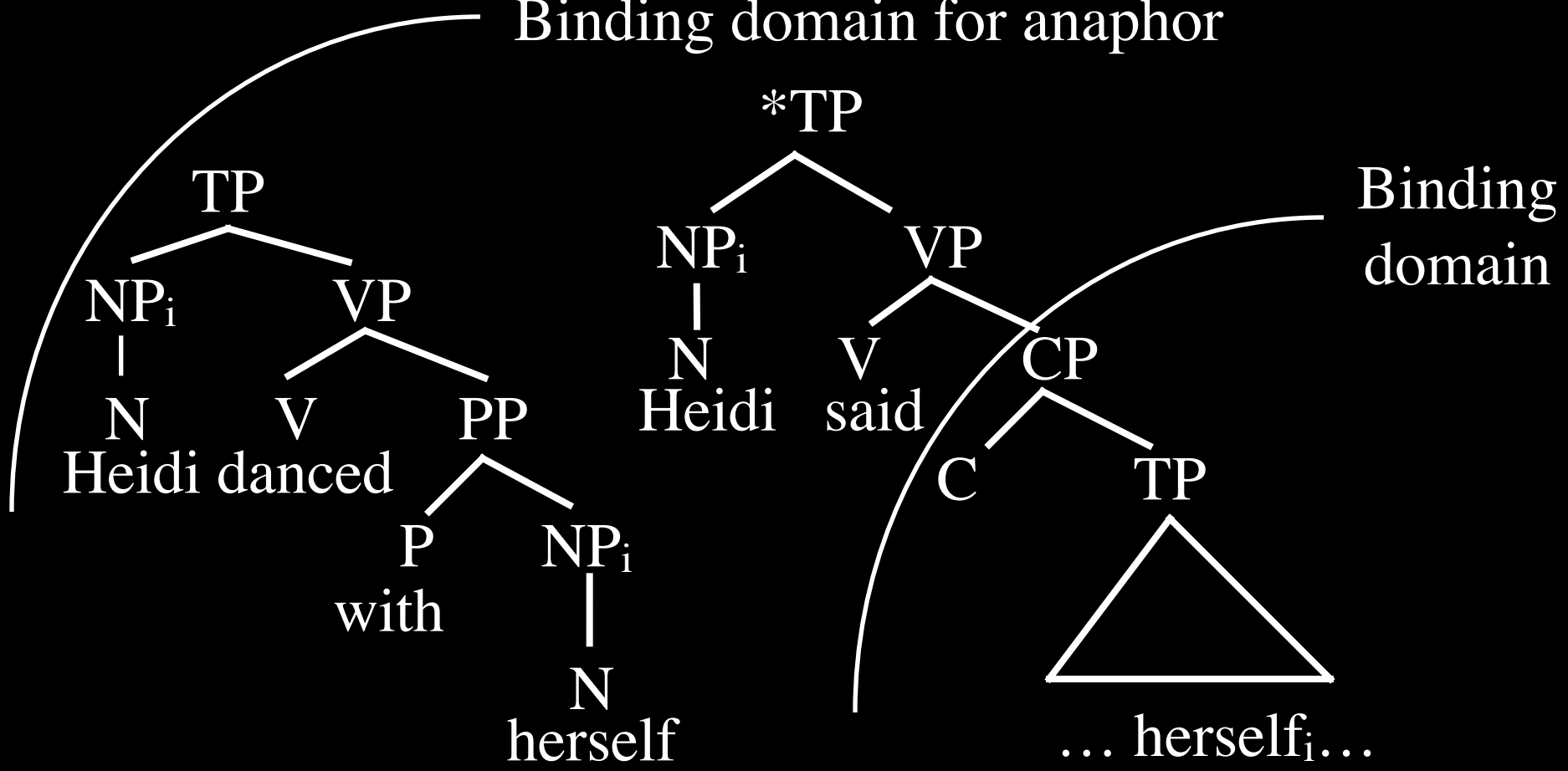
C-command? **yes** ∴ **Bound**

C-command? **yes** ∴ **Bound**

Bound in domain? **yes**

Bound in domain?

# Binding domain for anaphor



Coindexed? **yes**

Coindexed? **yes**

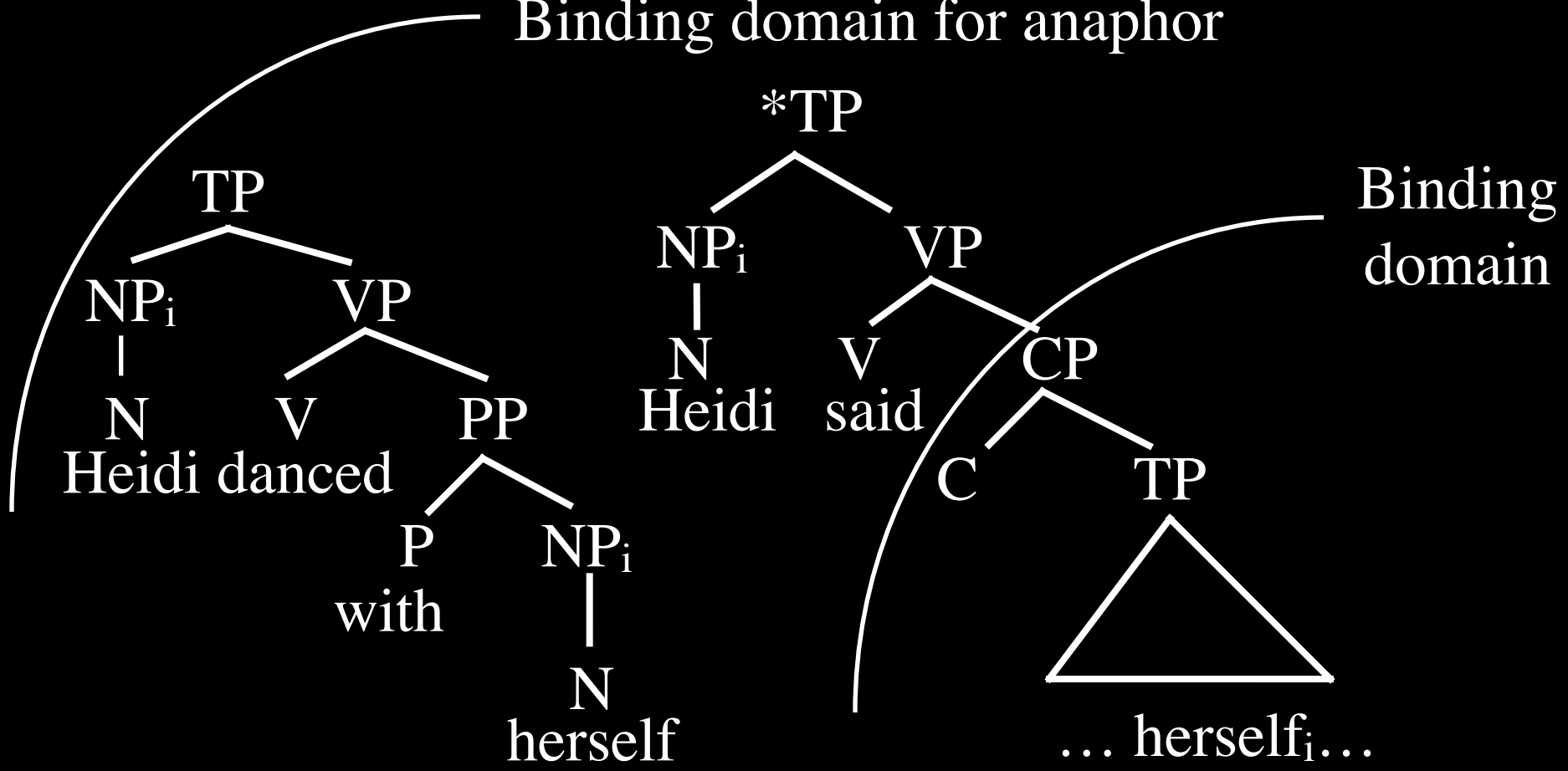
C-command? **yes** ∴ **Bound**

C-command? **yes** ∴ **Bound**

Bound in domain? **yes**

Bound in domain? **no**

# Binding domain for anaphor



Coindexed? **yes**

Coindexed? **yes**

C-command? **yes** ∴ **Bound**

C-command? **yes** ∴ **Bound**

Bound in domain? **yes**

Bound in domain? **no**

**VIOLATES PRINCIPLE A**

# interim summary

- 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.

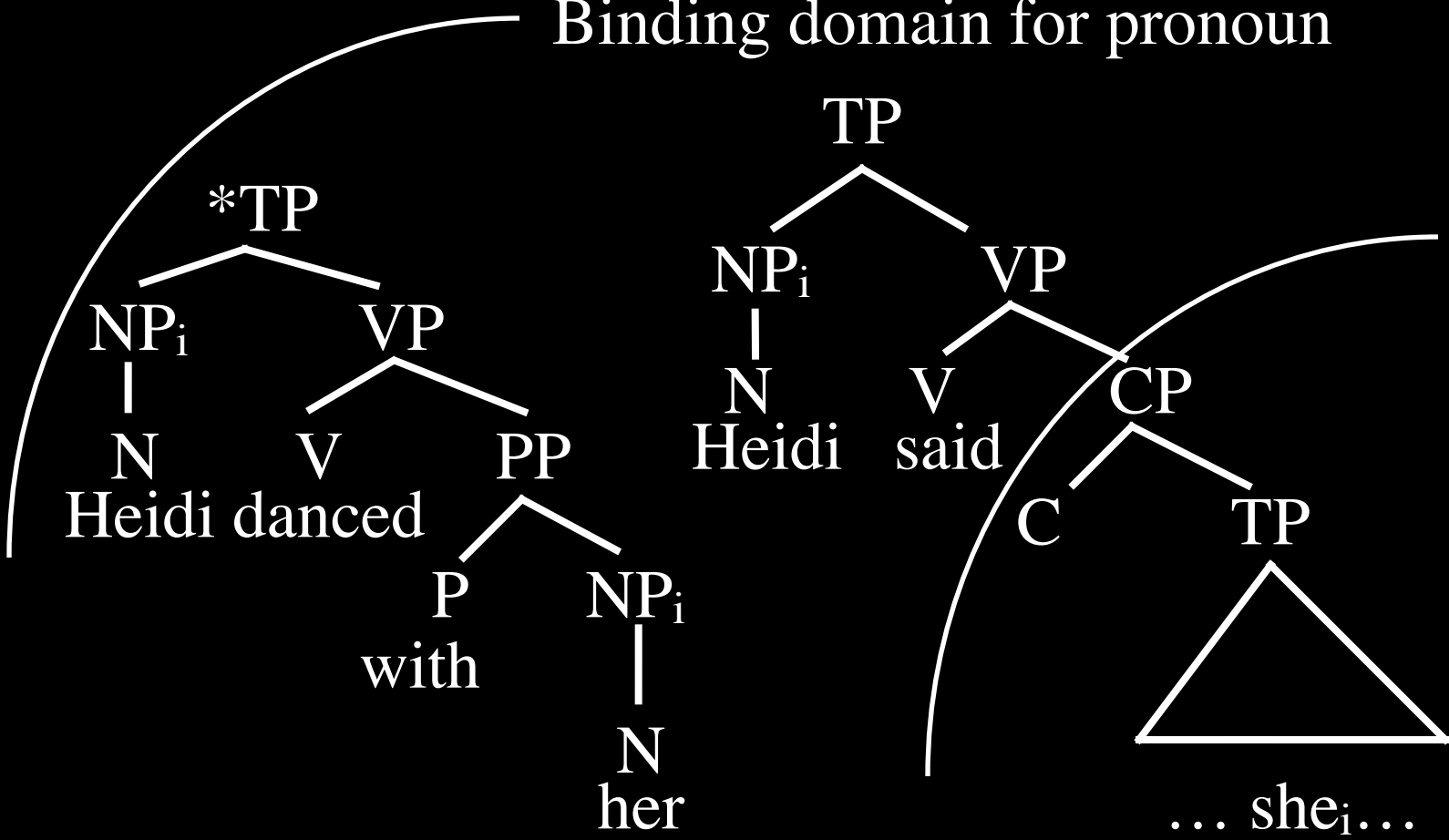
# Pronouns

- Heidi<sub>i</sub> bopped her<sub>k</sub> on the head with the zucchini
- \*Heidi<sub>i</sub> bopped her<sub>i</sub> on the head with the zucchini
- Heidi<sub>i</sub> said that she<sub>i</sub> danced with Art
- Heidi<sub>i</sub> said that she<sub>k</sub> 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

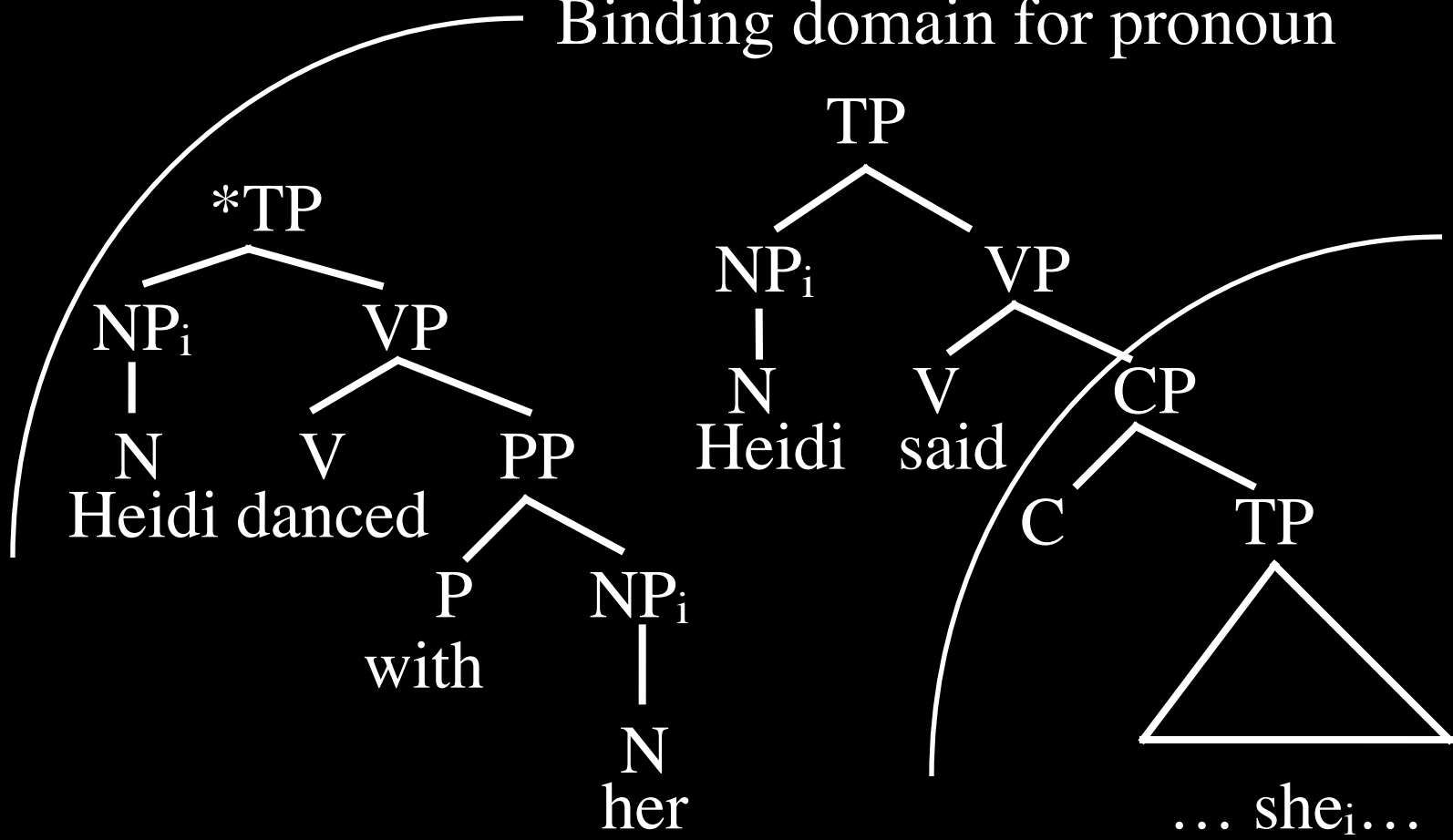


Binding domain

... she<sub>i</sub>...



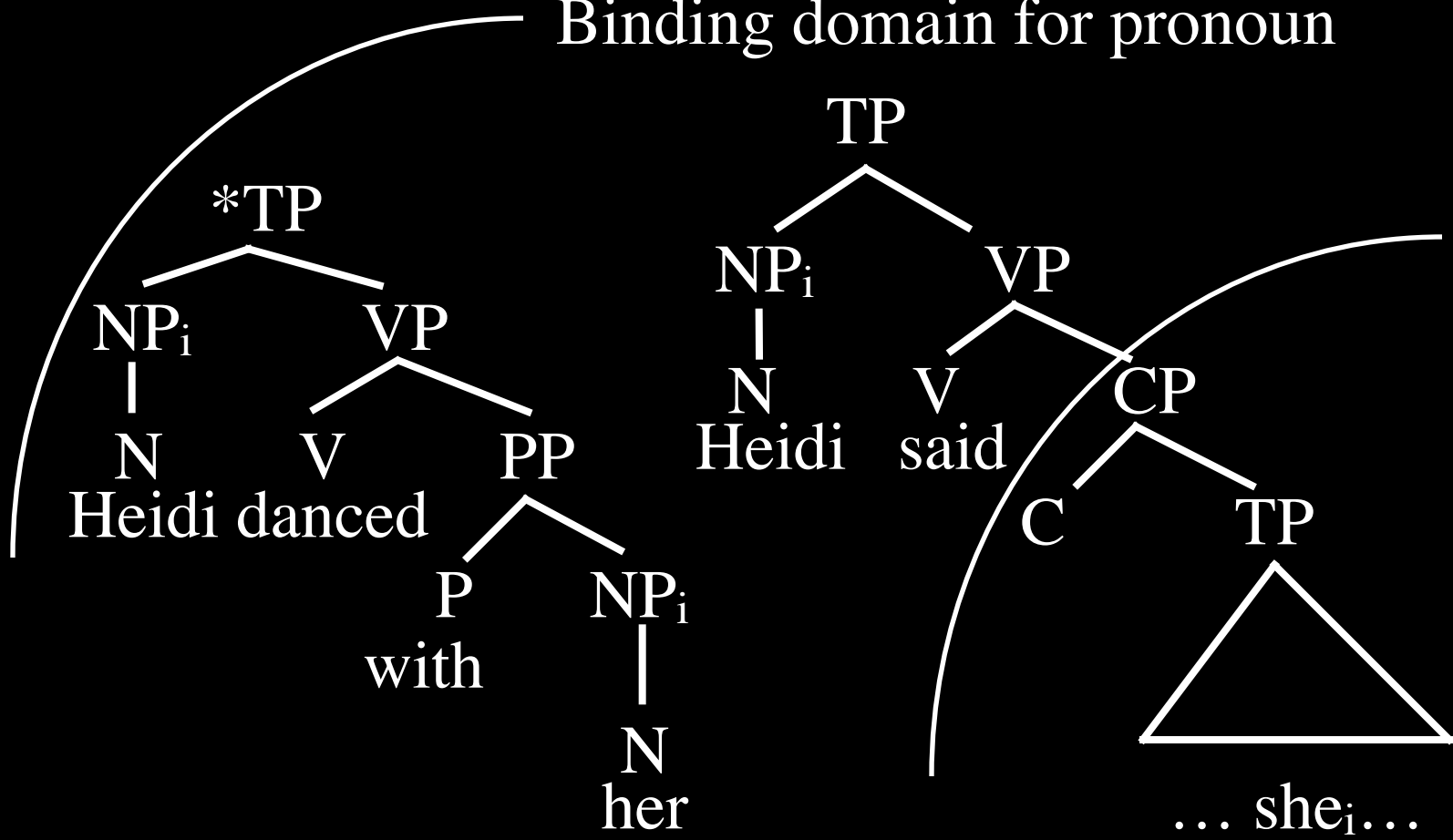
Binding domain for pronoun



Binding domain

Coindexed?

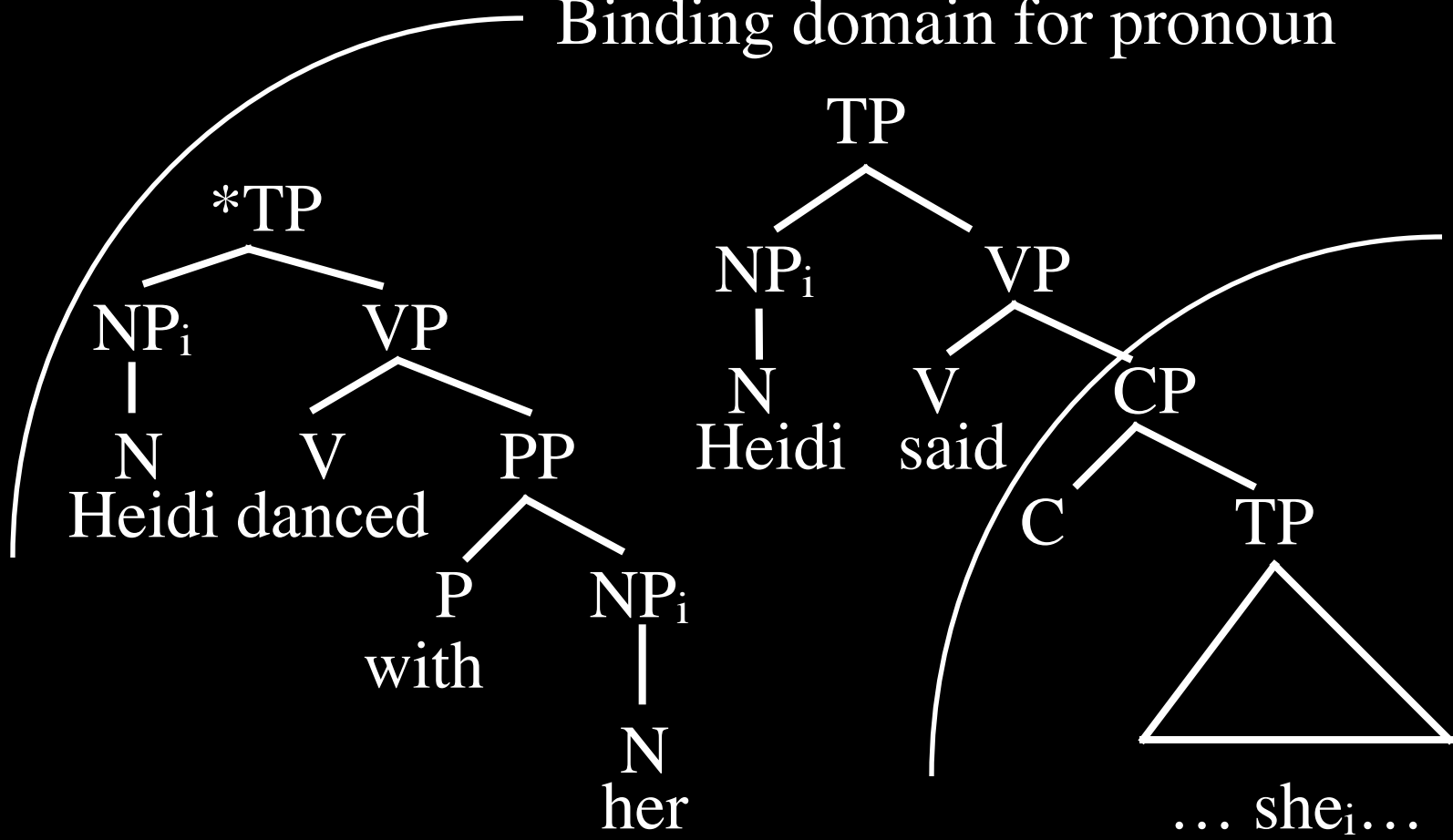
Binding domain for pronoun



Binding domain

Coindexed? **yes**

Binding domain for pronoun

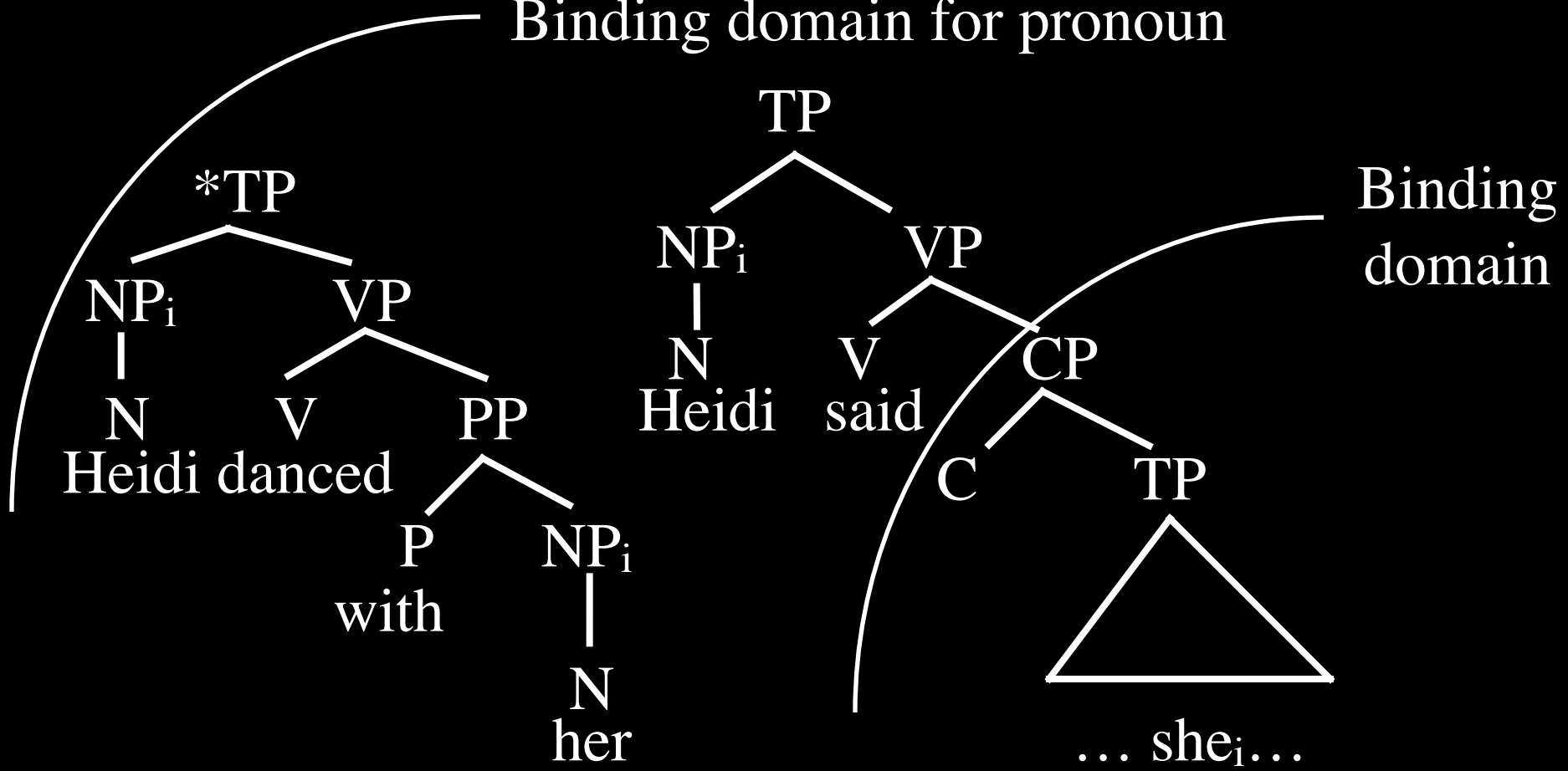


Binding domain

Coindexed? **yes**

C-command?

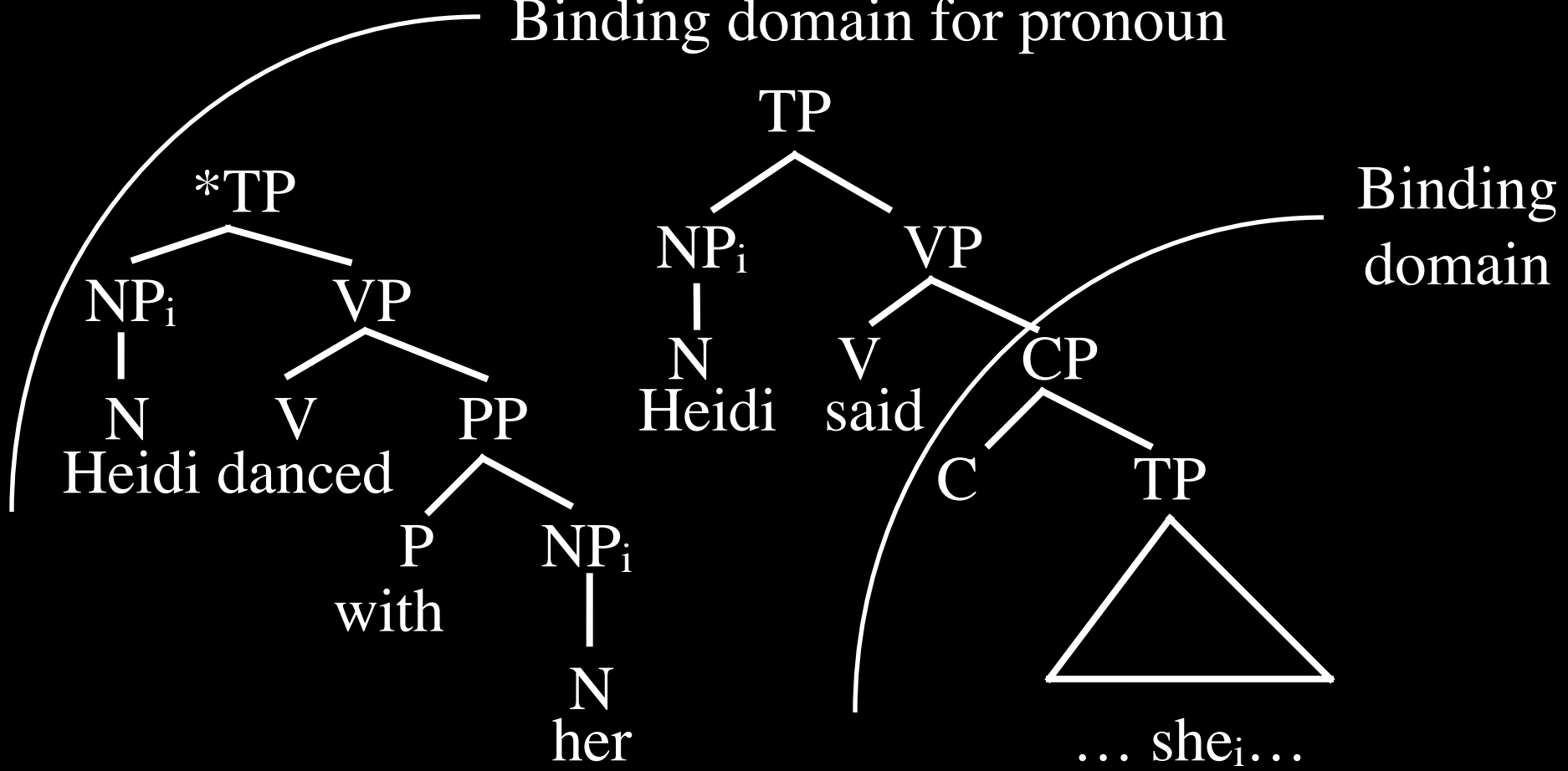
# Binding domain for pronoun



Coindexed? **yes**

C-command? **yes ∴ Bound**

# Binding domain for pronoun

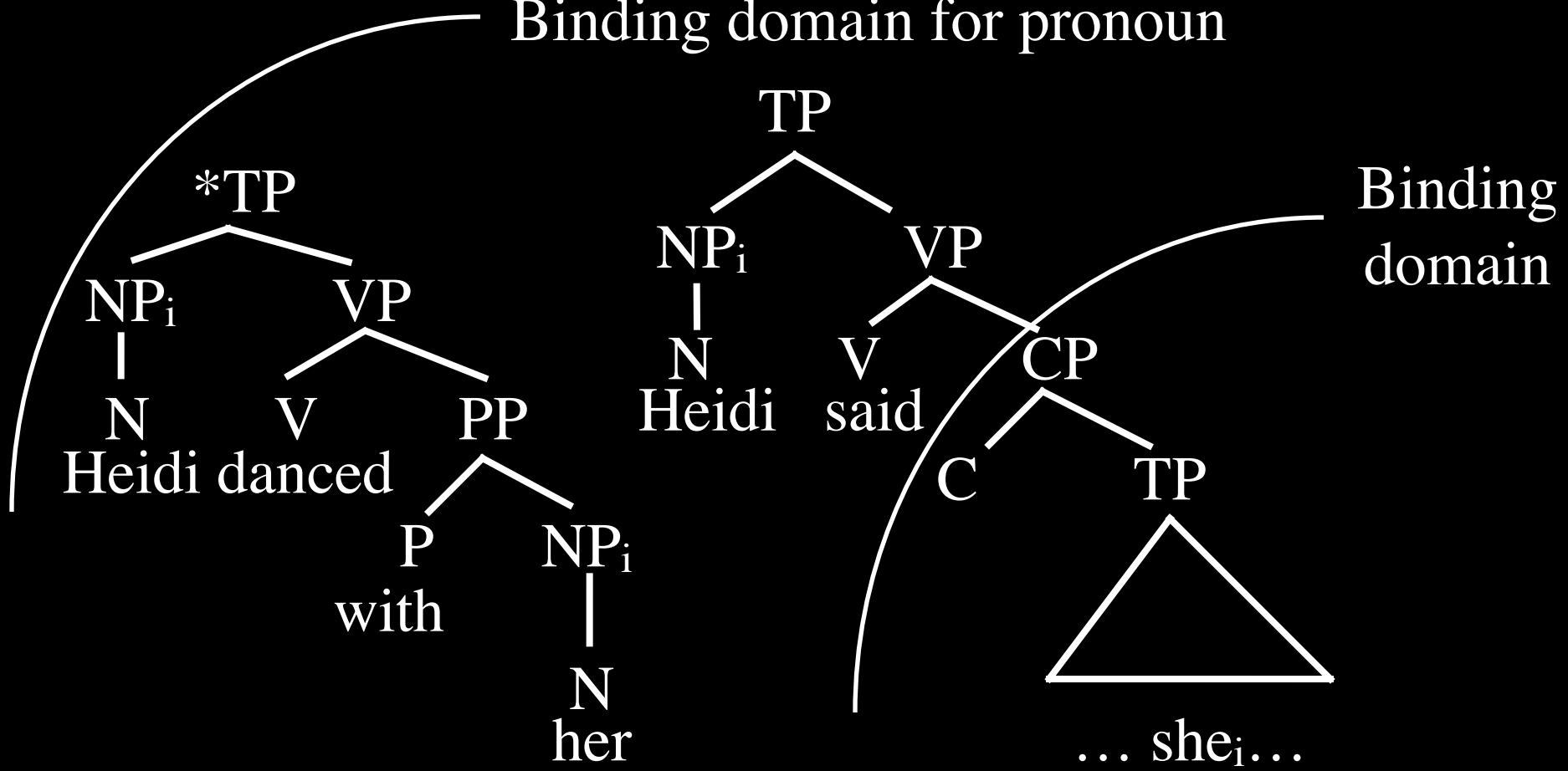


Coindexed? **yes**

C-command? **yes ∴ Bound**

Free in domain?

# Binding domain for pronoun

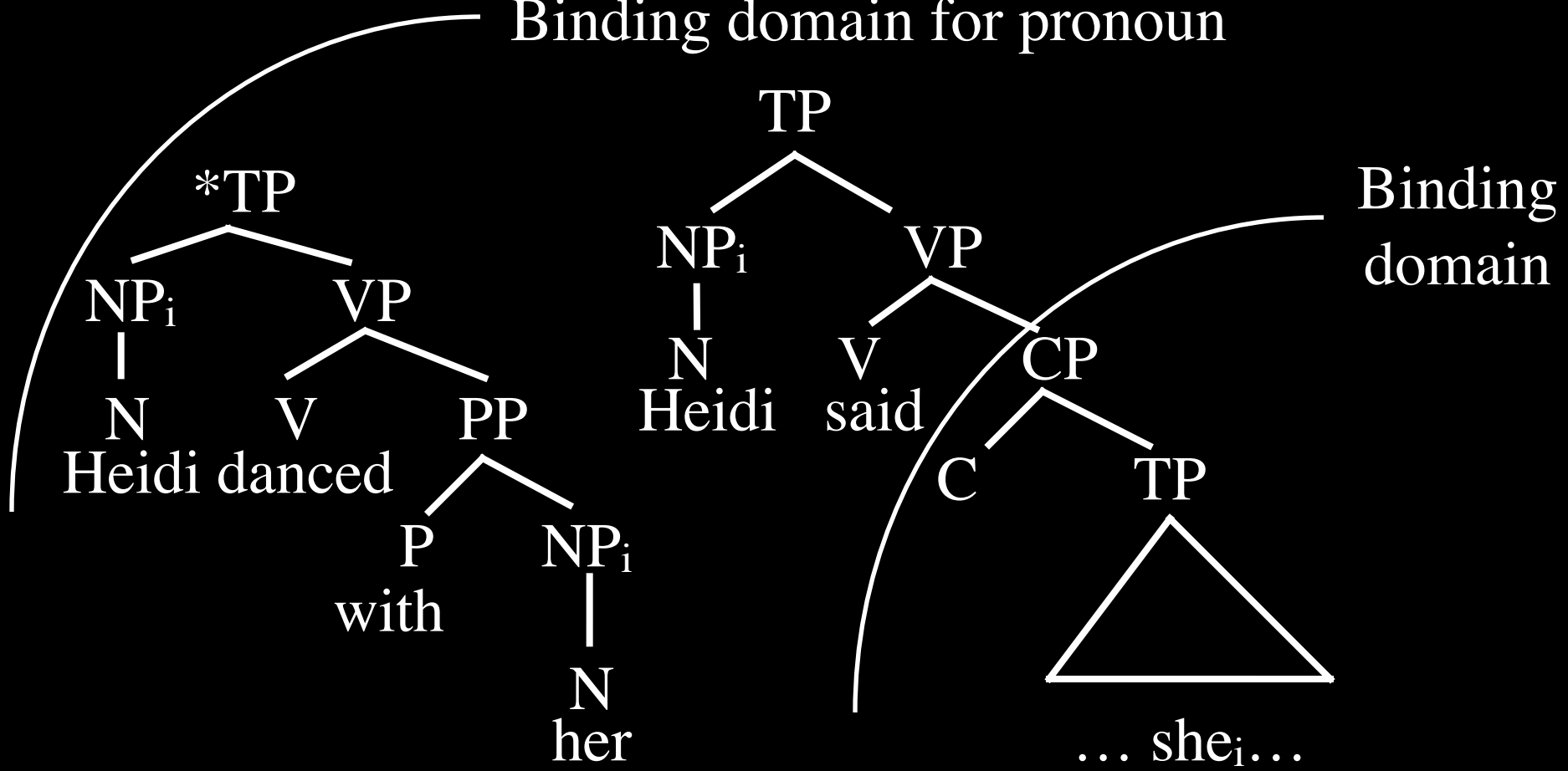


Coindexed? **yes**

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

Free in domain? **no**

Binding domain for pronoun



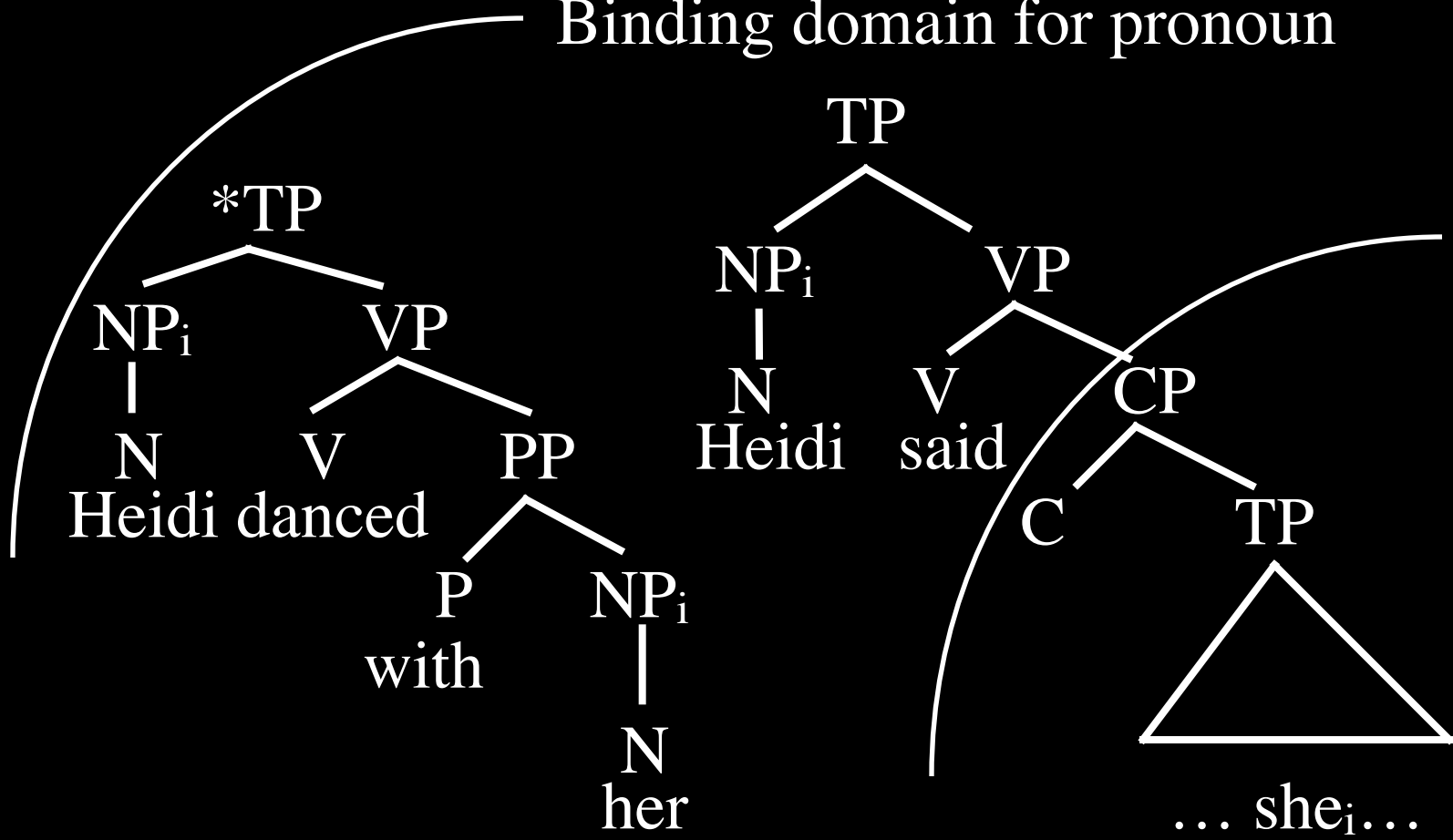
Coindexed? **yes**

C-command? **yes ∴ Bound**

Free in domain? **no**

**VIOLATES PRINCIPLE B**

Binding domain for pronoun



Binding domain

Coindexed? **yes**

Coindexed?

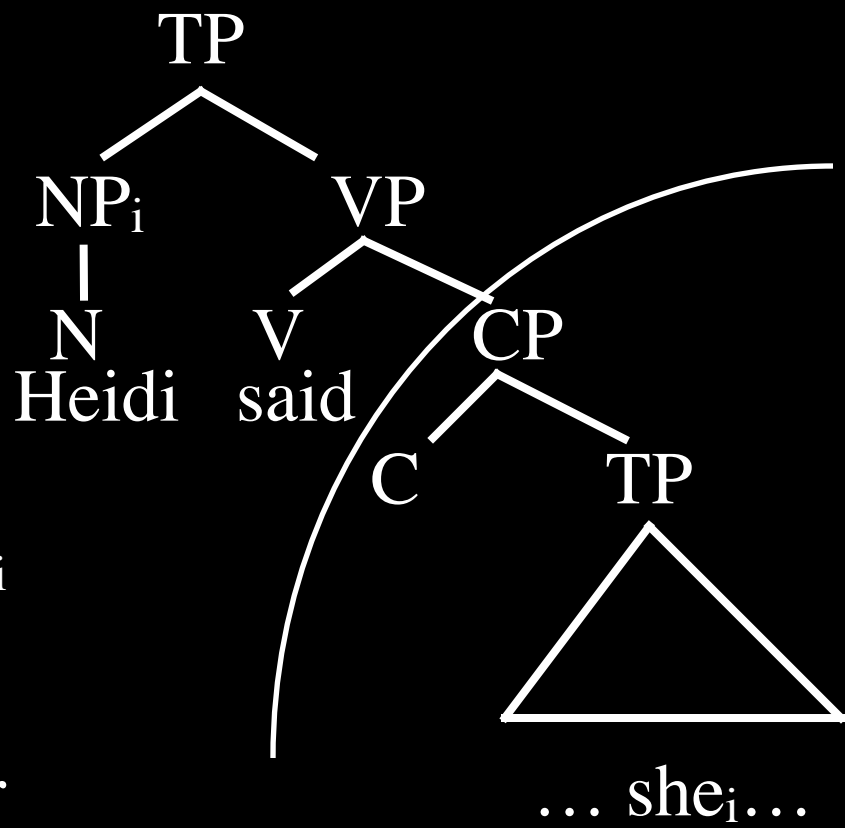
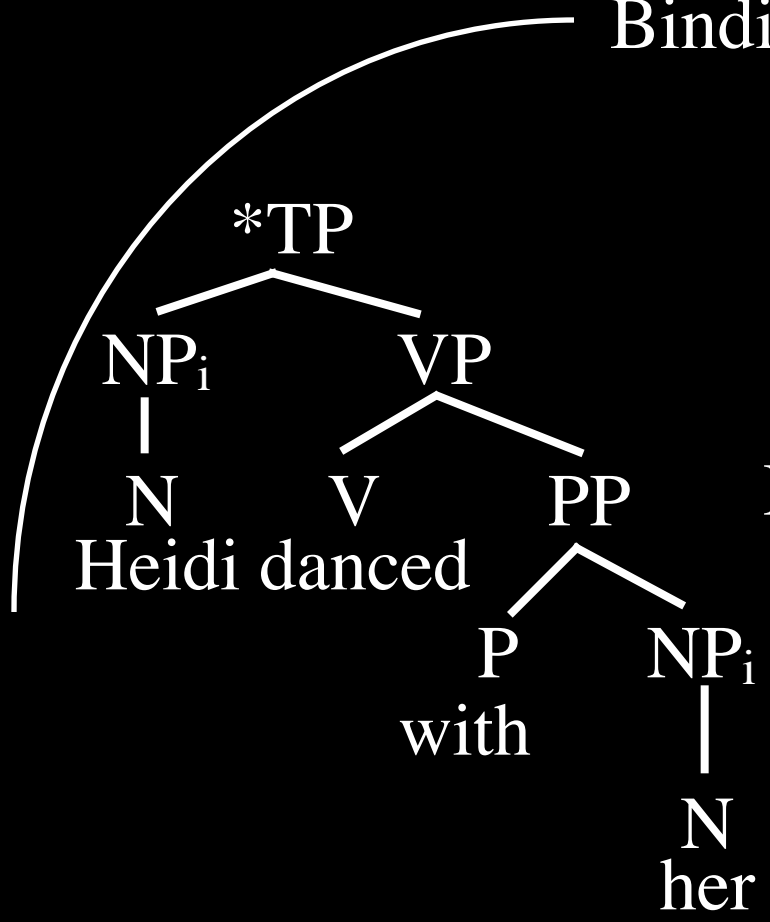
C-command? **yes ∴ Bound**

Free in domain? **no**

**VIOLATES PRINCIPLE B**



Binding domain for pronoun



Binding domain

Coindexed? **yes**

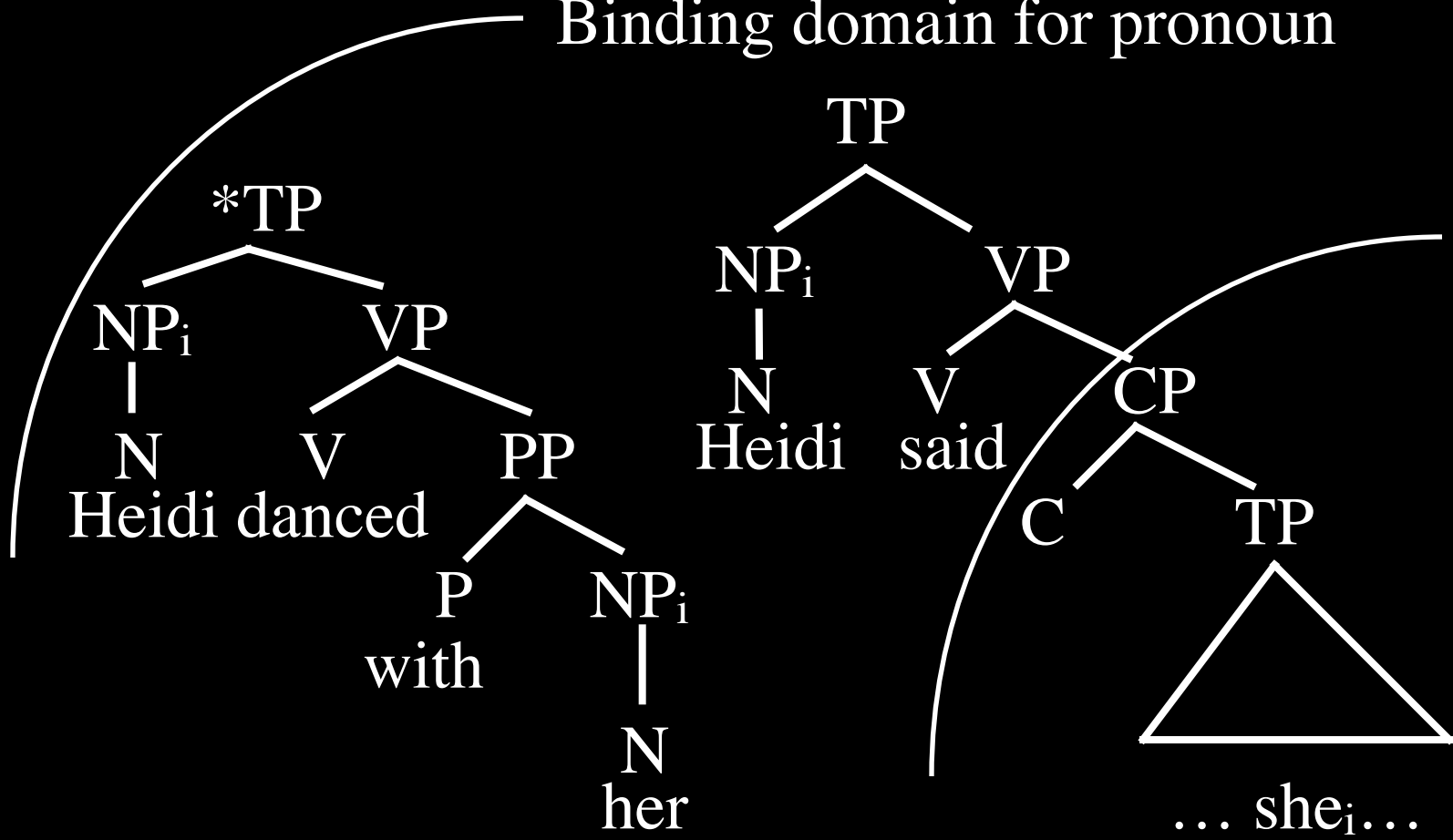
Coindexed? **yes**

C-command? **yes ∴ Bound**

Free in domain? **no**

**VIOLATES PRINCIPLE B**

Binding domain for pronoun



Binding domain

Coindexed? **yes**

Coindexed? **yes**

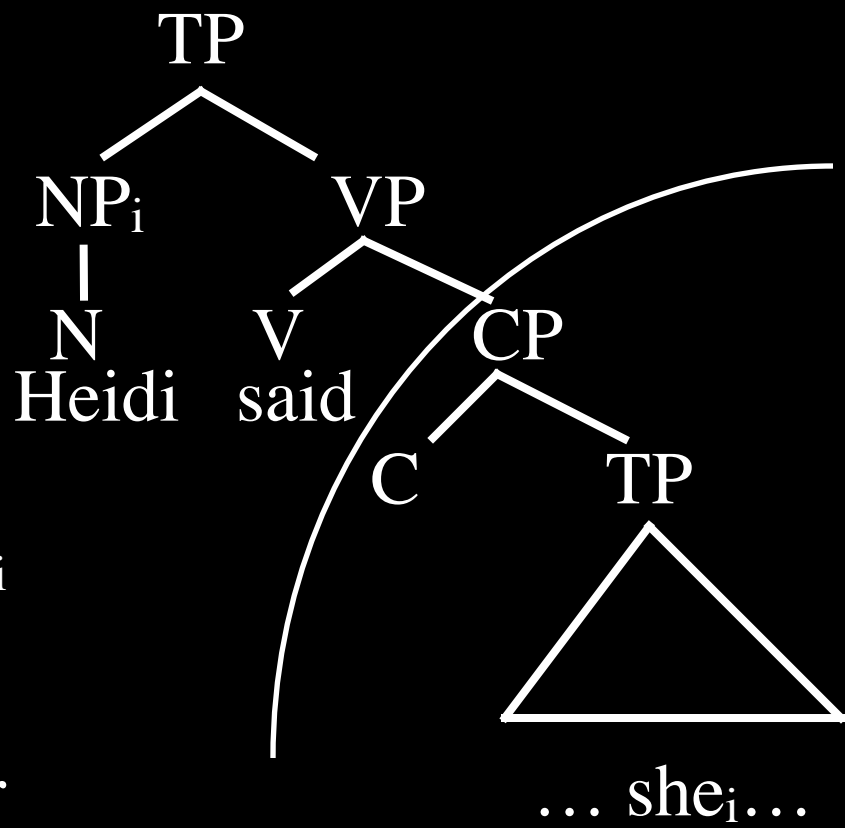
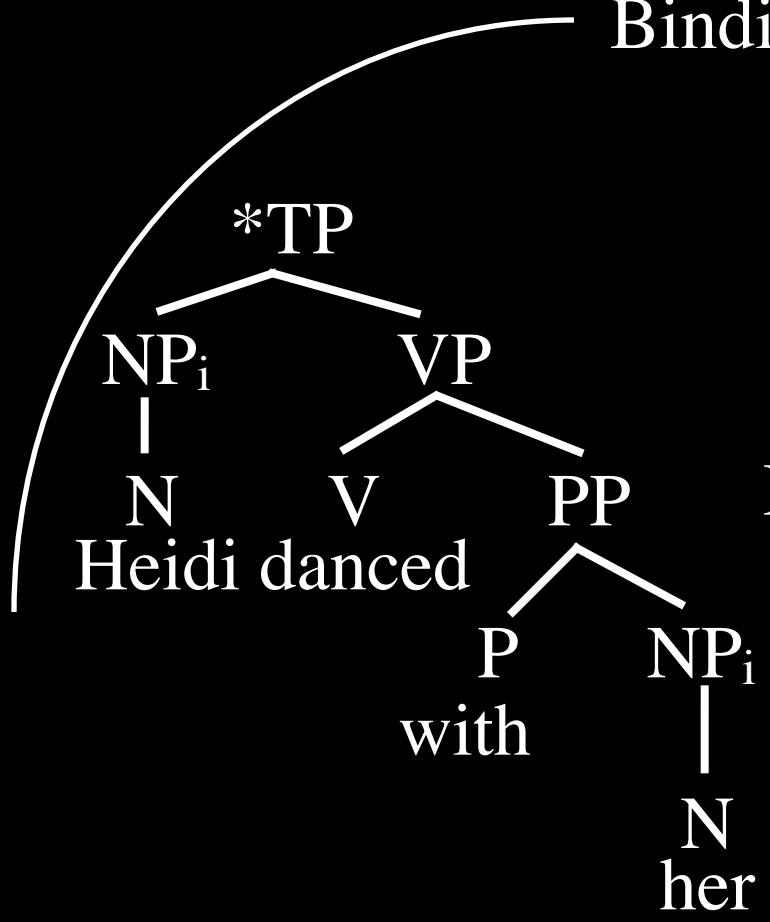
C-command? **yes** ∴ **Bound**

C-command?

Free in domain? **no**

**VIOLATES PRINCIPLE B**

Binding domain for pronoun



Binding domain

Coindexed? **yes**

Coindexed? **yes**

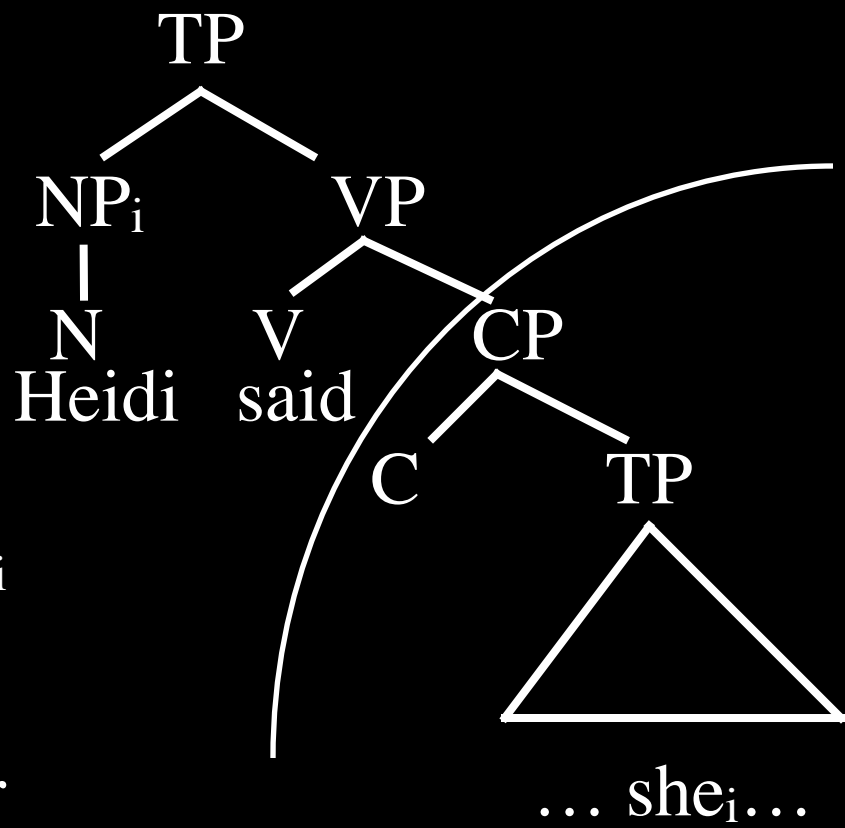
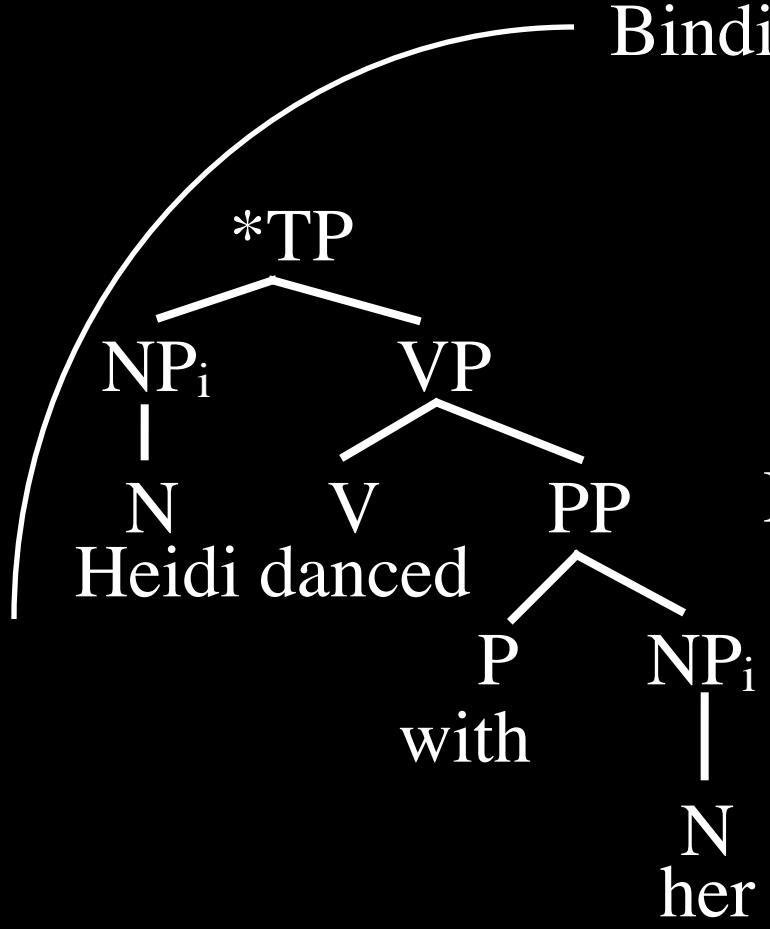
C-command? **yes ∴ Bound**

C-command? **yes ∴ Bound**

Free in domain? **no**

**VIOLATES PRINCIPLE B**

Binding domain for pronoun



Binding domain

Coindexed? **yes**

C-command? **yes ∴ Bound**

Free in domain? **no**

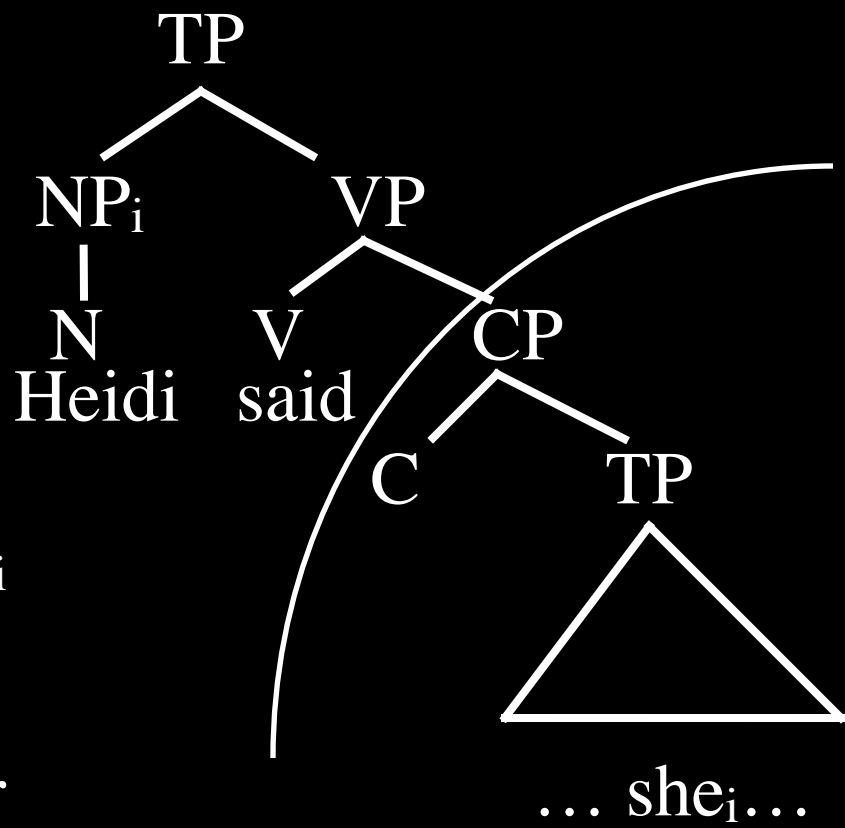
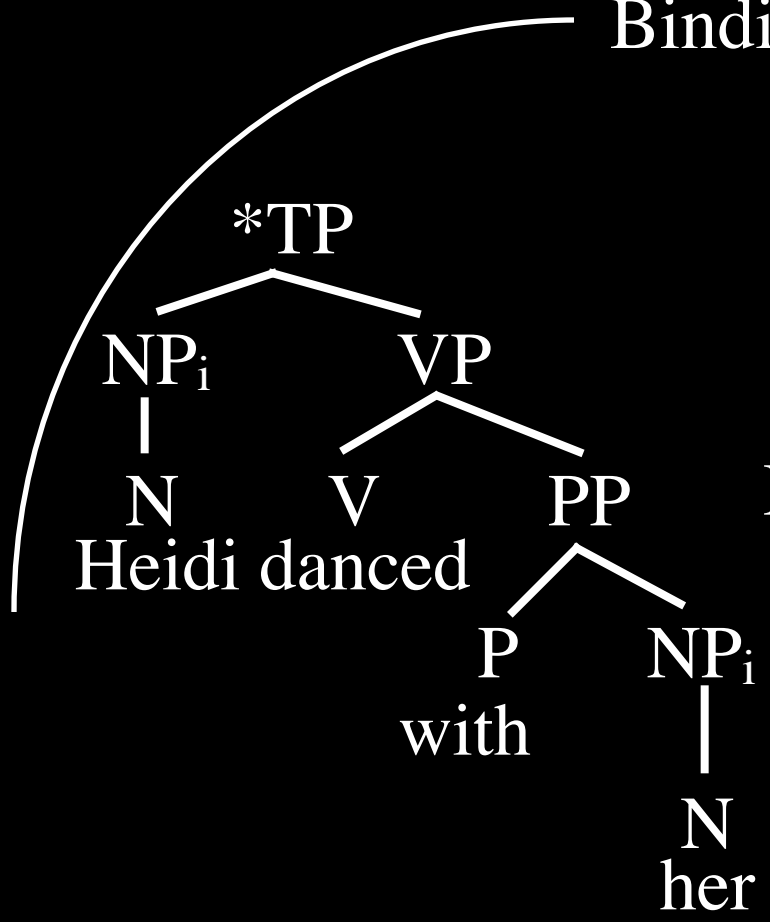
Coindexed? **yes**

C-command? **yes ∴ Bound**

Free in domain?

**VIOLATES PRINCIPLE B**

Binding domain for pronoun



Binding domain

Coindexed? **yes**

C-command? **yes** ∴ **Bound**

Free in domain? **no**

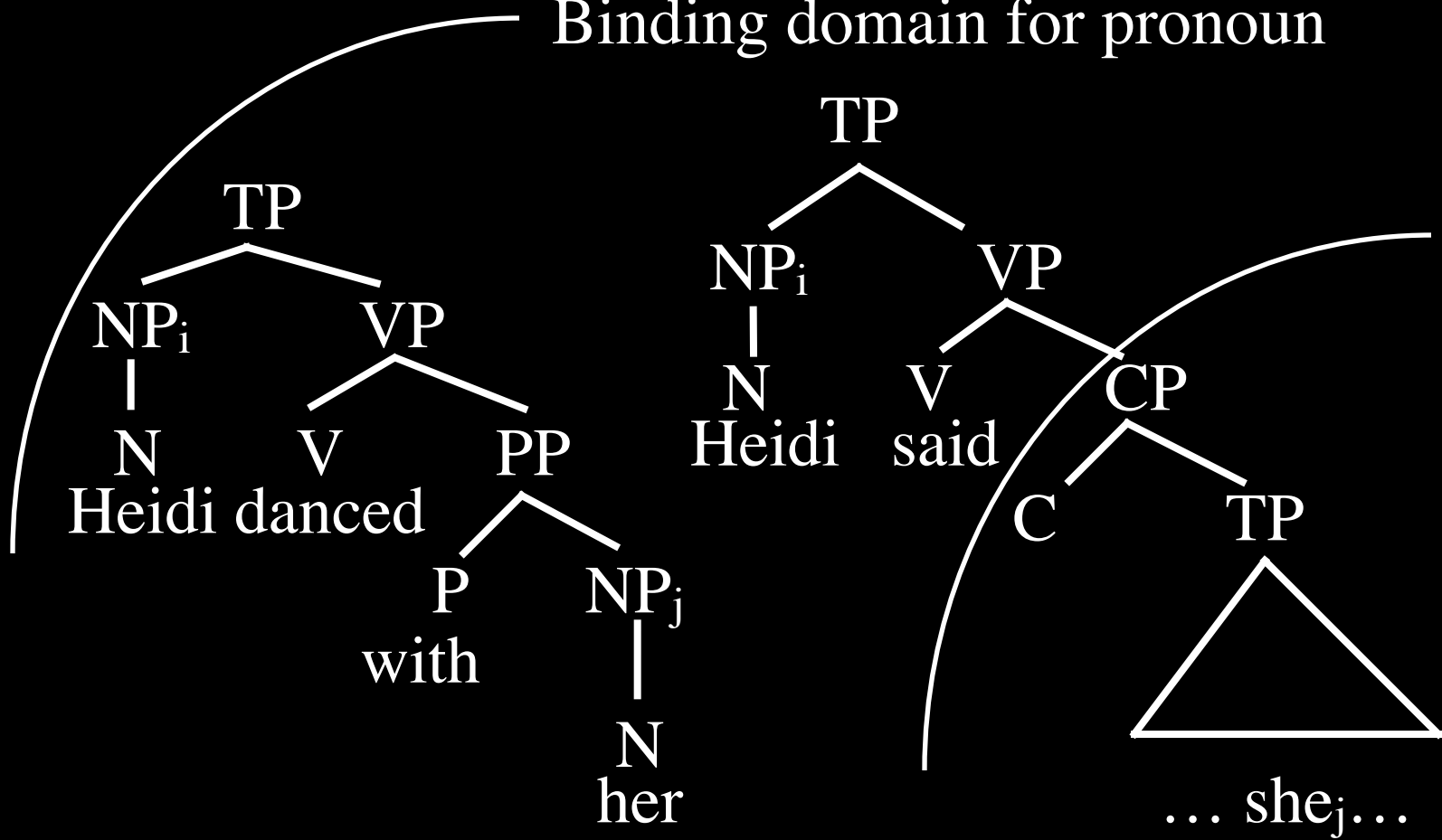
Coindexed? **yes**

C-command? **yes** ∴ **Bound**

Free in domain? **yes**

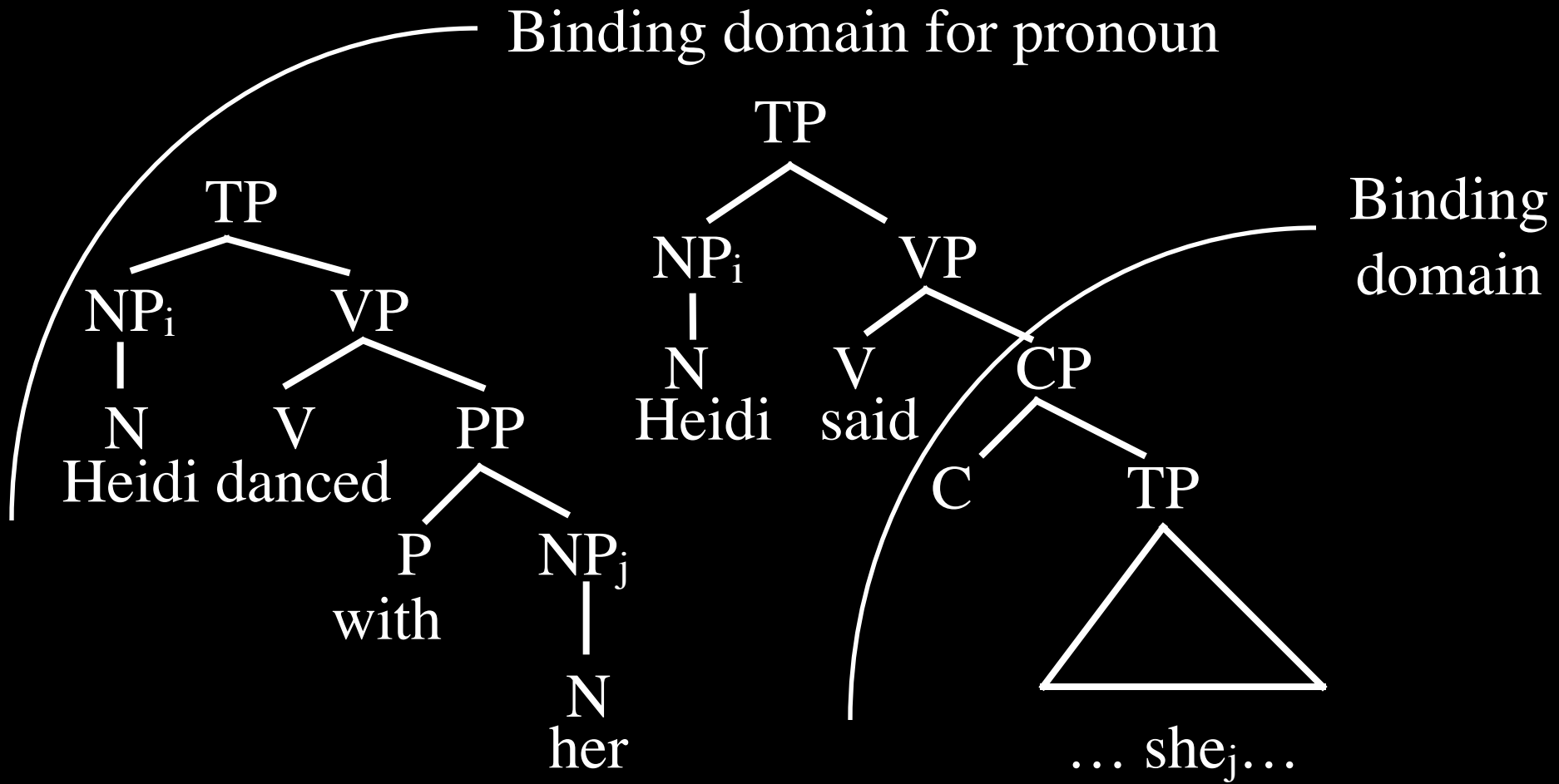
**VIOLATES PRINCIPLE B**

Binding domain for pronoun



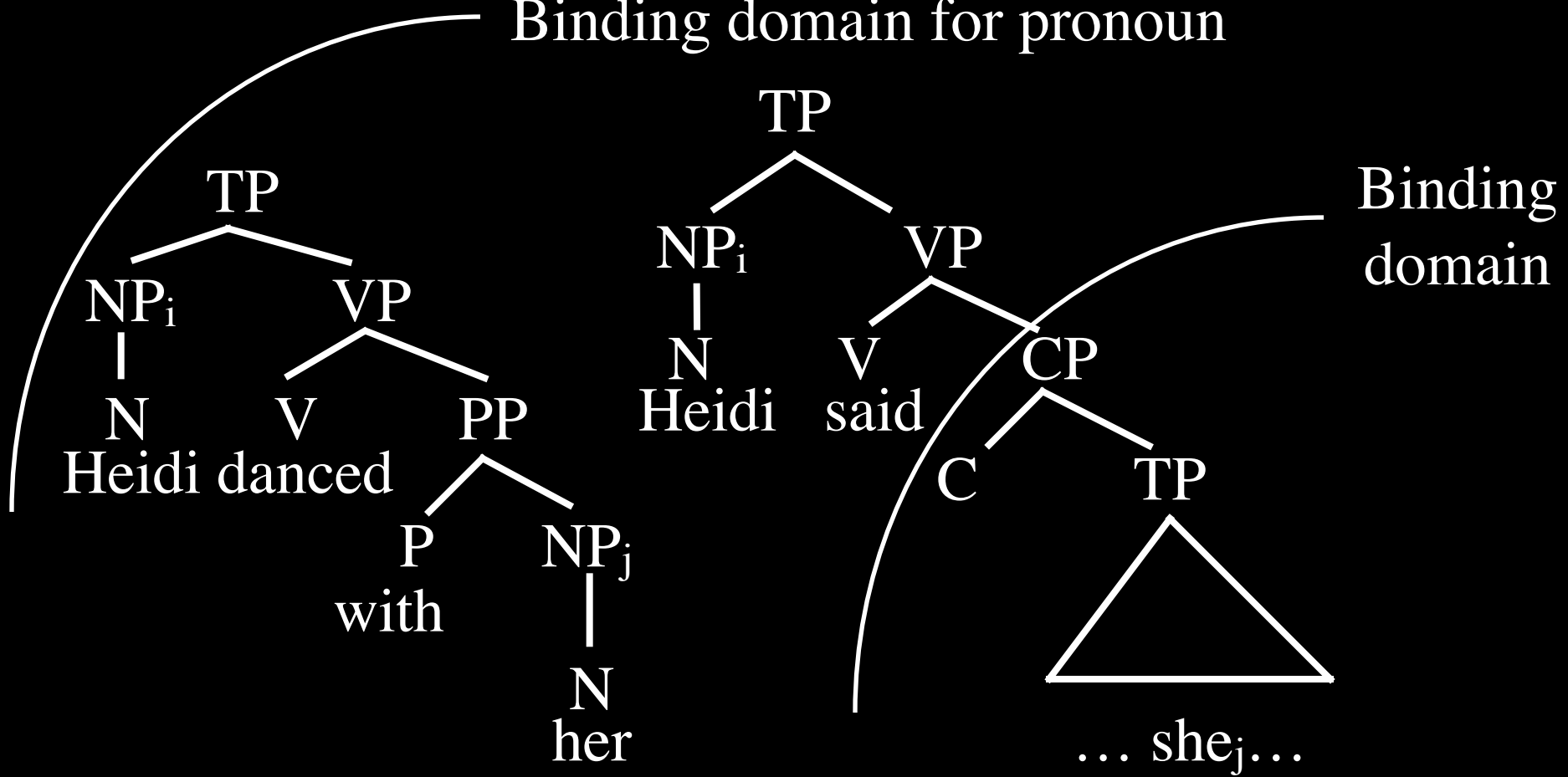
Binding domain

Binding domain for pronoun



Coindexed?

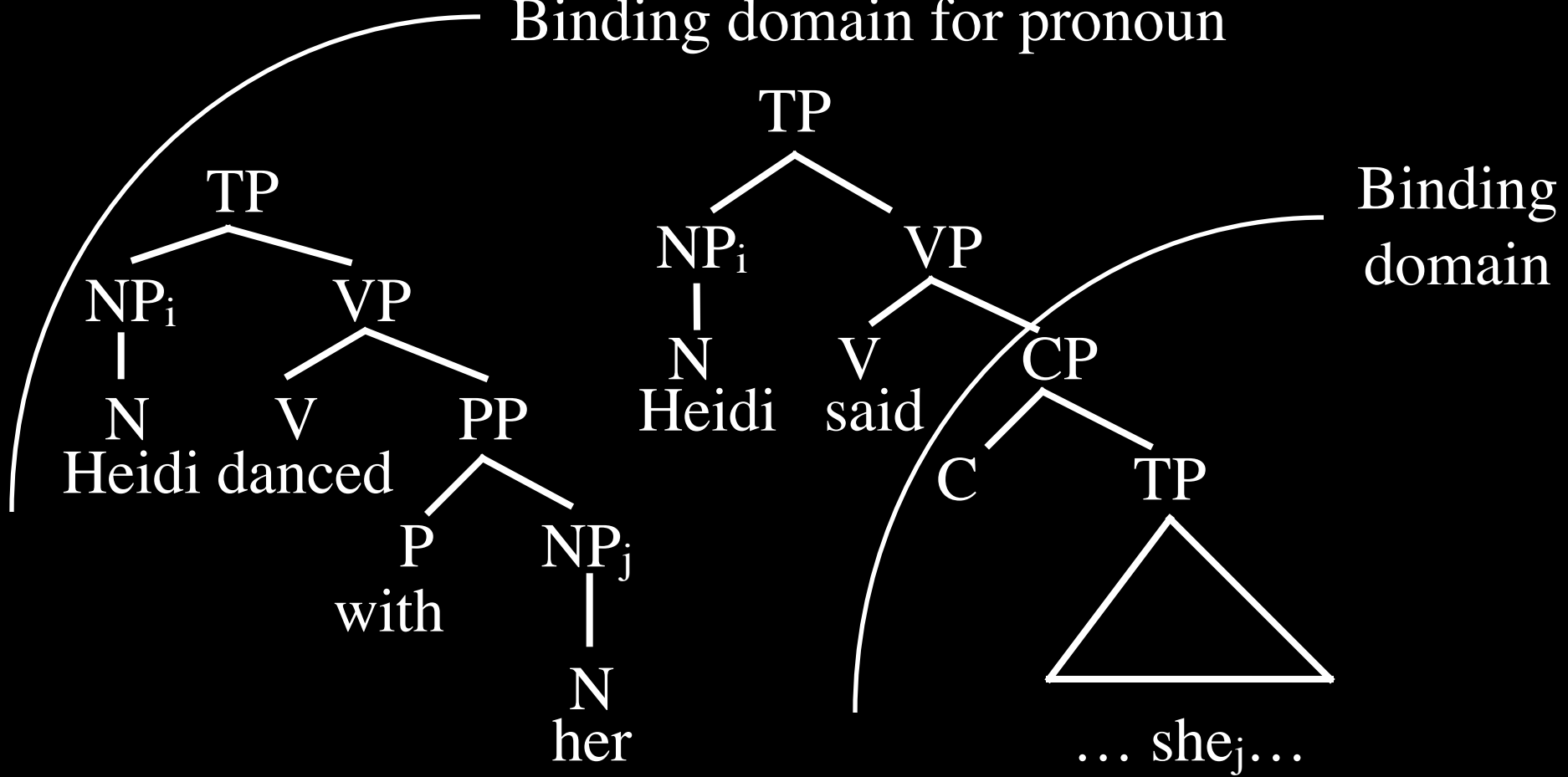
Binding domain for pronoun



Coindexed? **no** ∴ **not Bound**



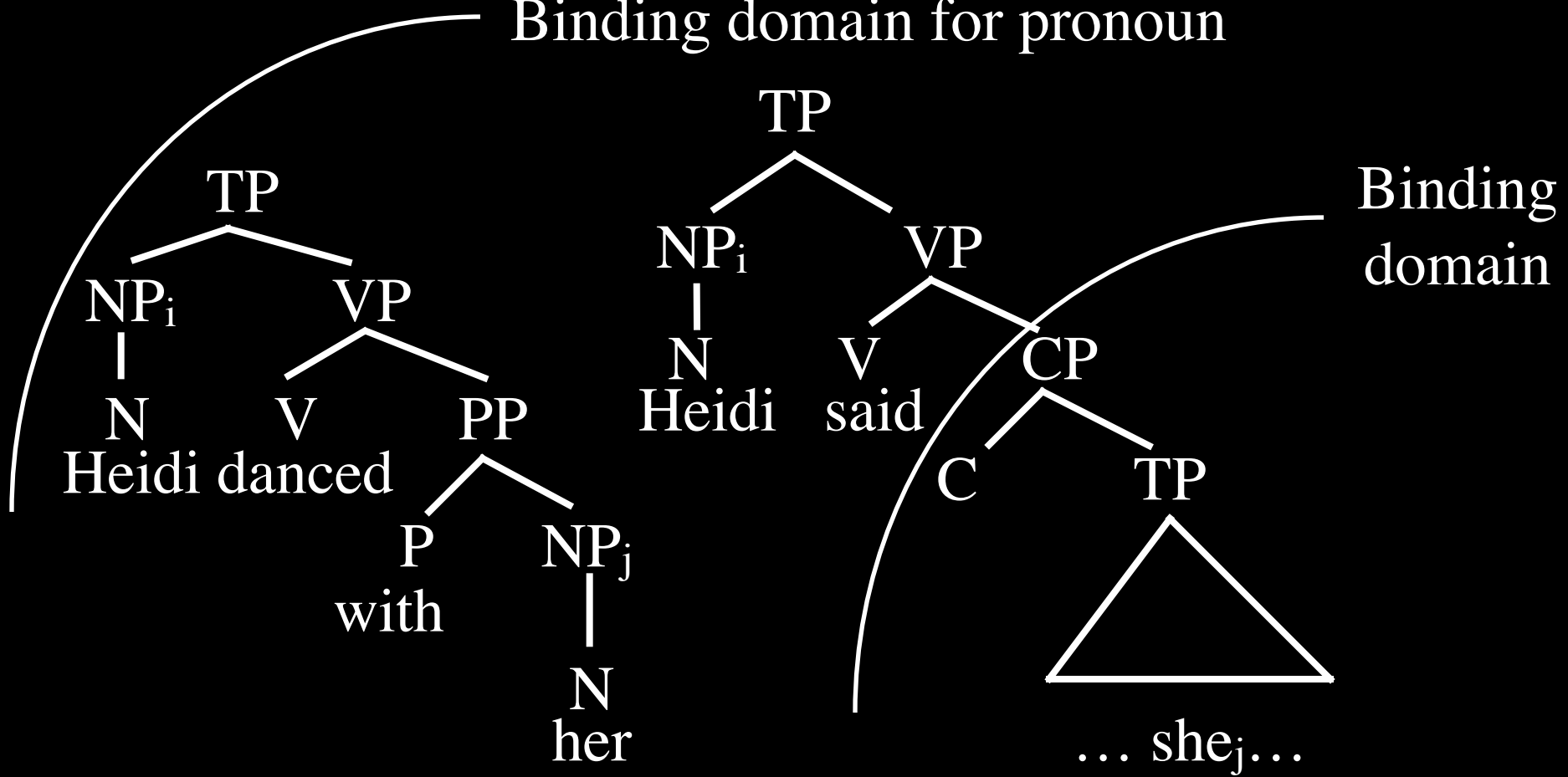
Binding domain for pronoun



Coindexed? **no** ∴ **not Bound**

Free in domain?

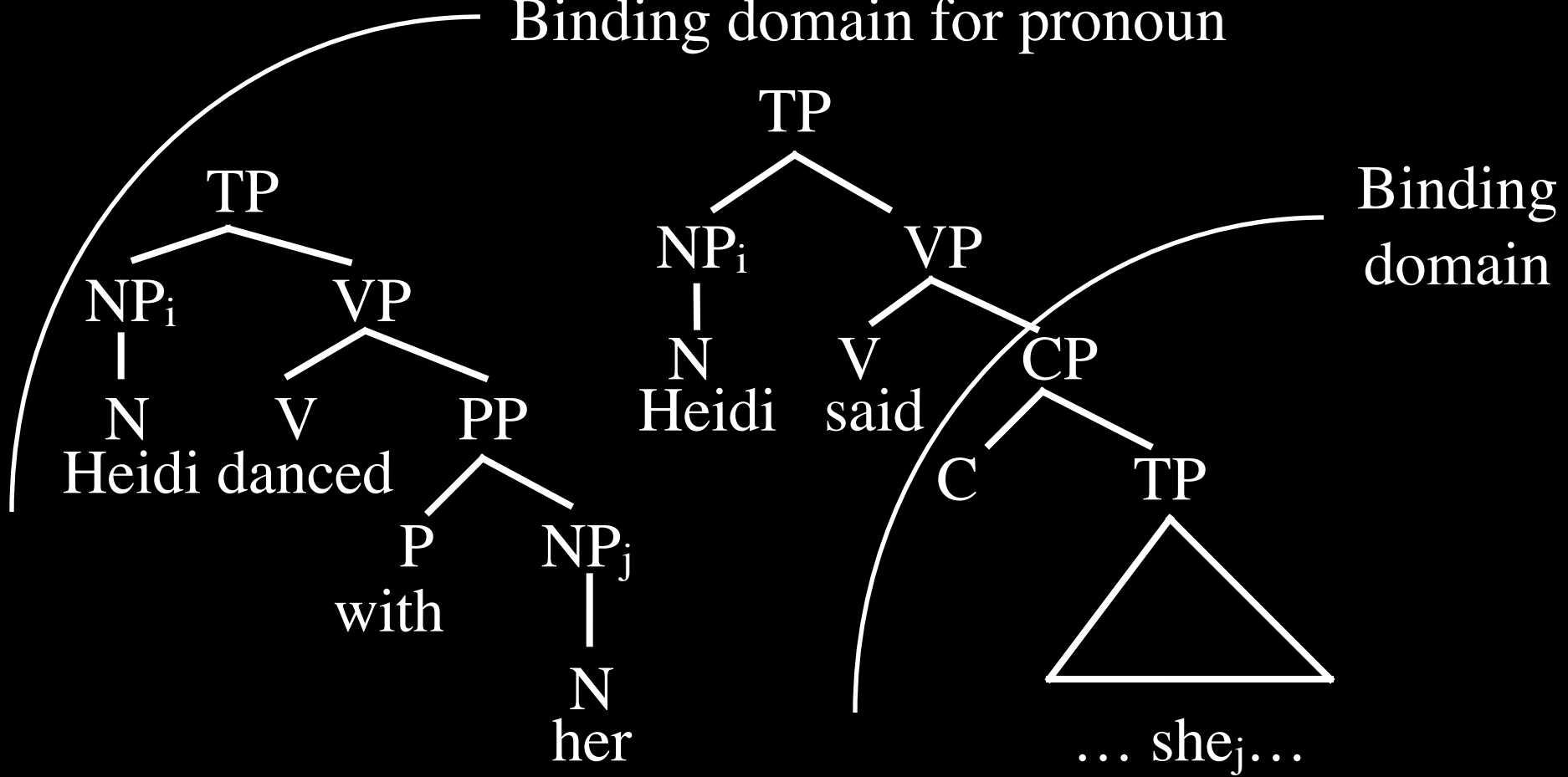
Binding domain for pronoun



Coindexed? **no** ∴ **not Bound**

Free in domain? **Yes**

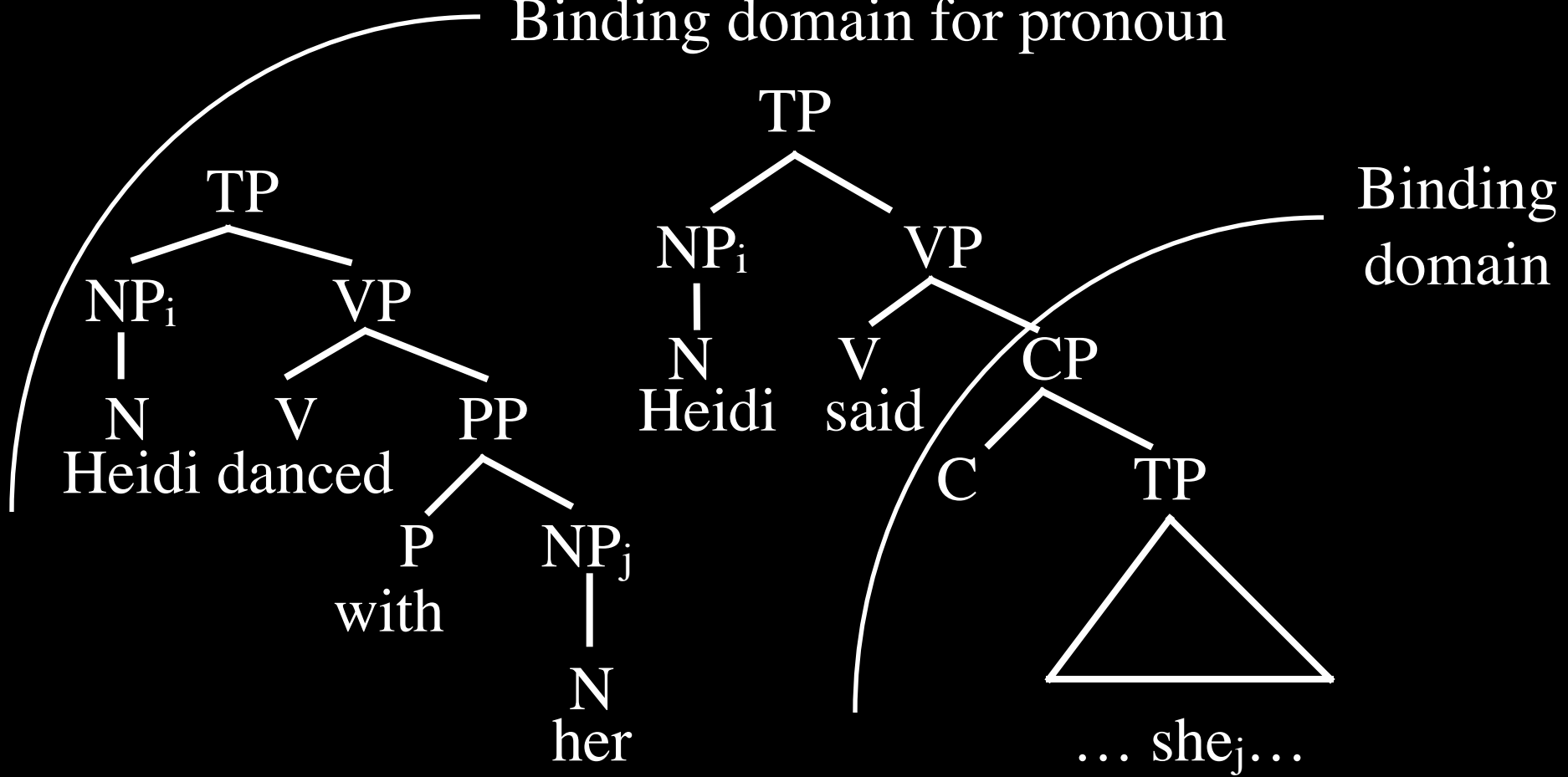
Binding domain for pronoun



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

Free in domain? **Yes**

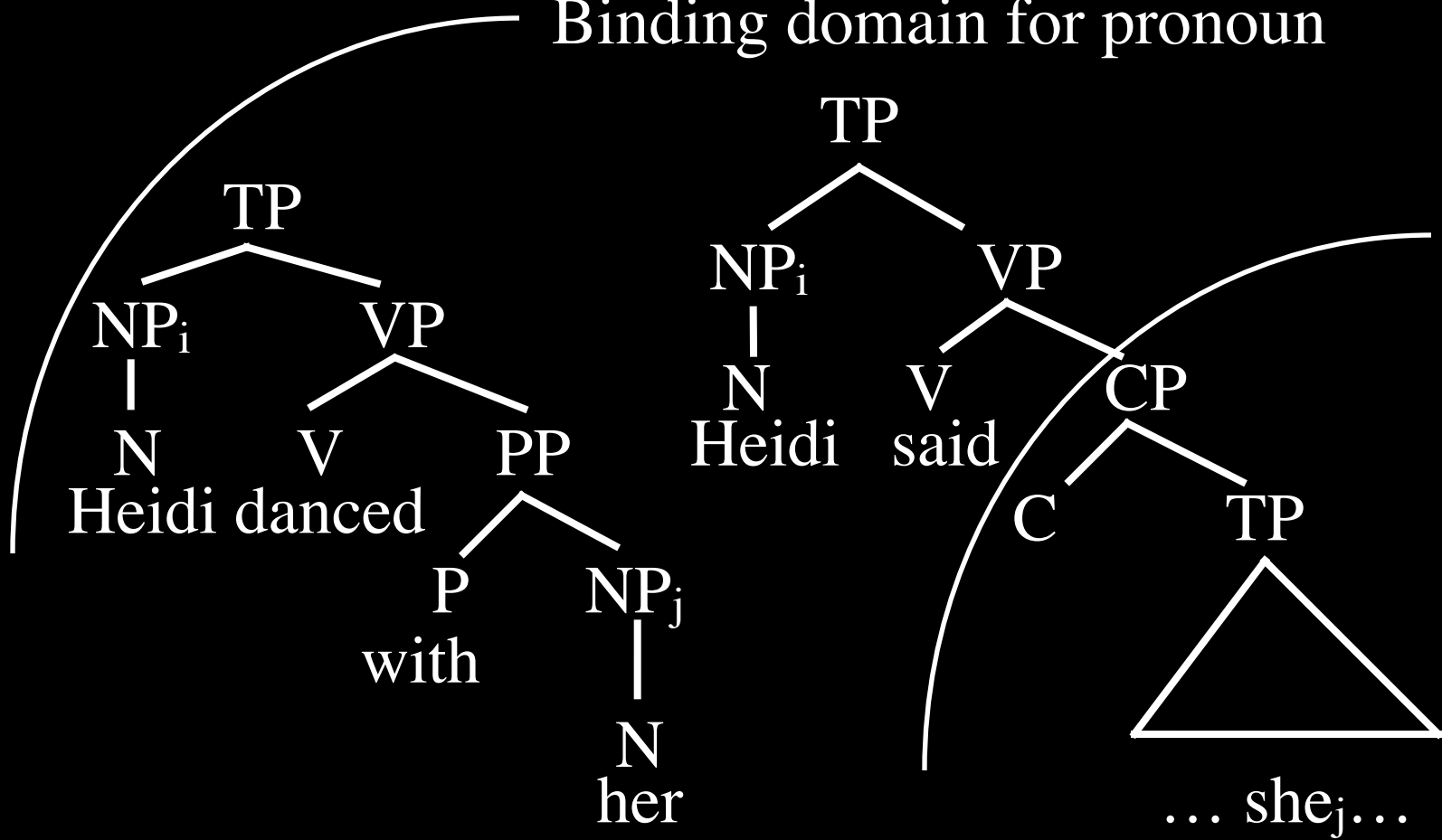
Binding domain for pronoun



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

Free in domain? **Yes**

Binding domain for pronoun

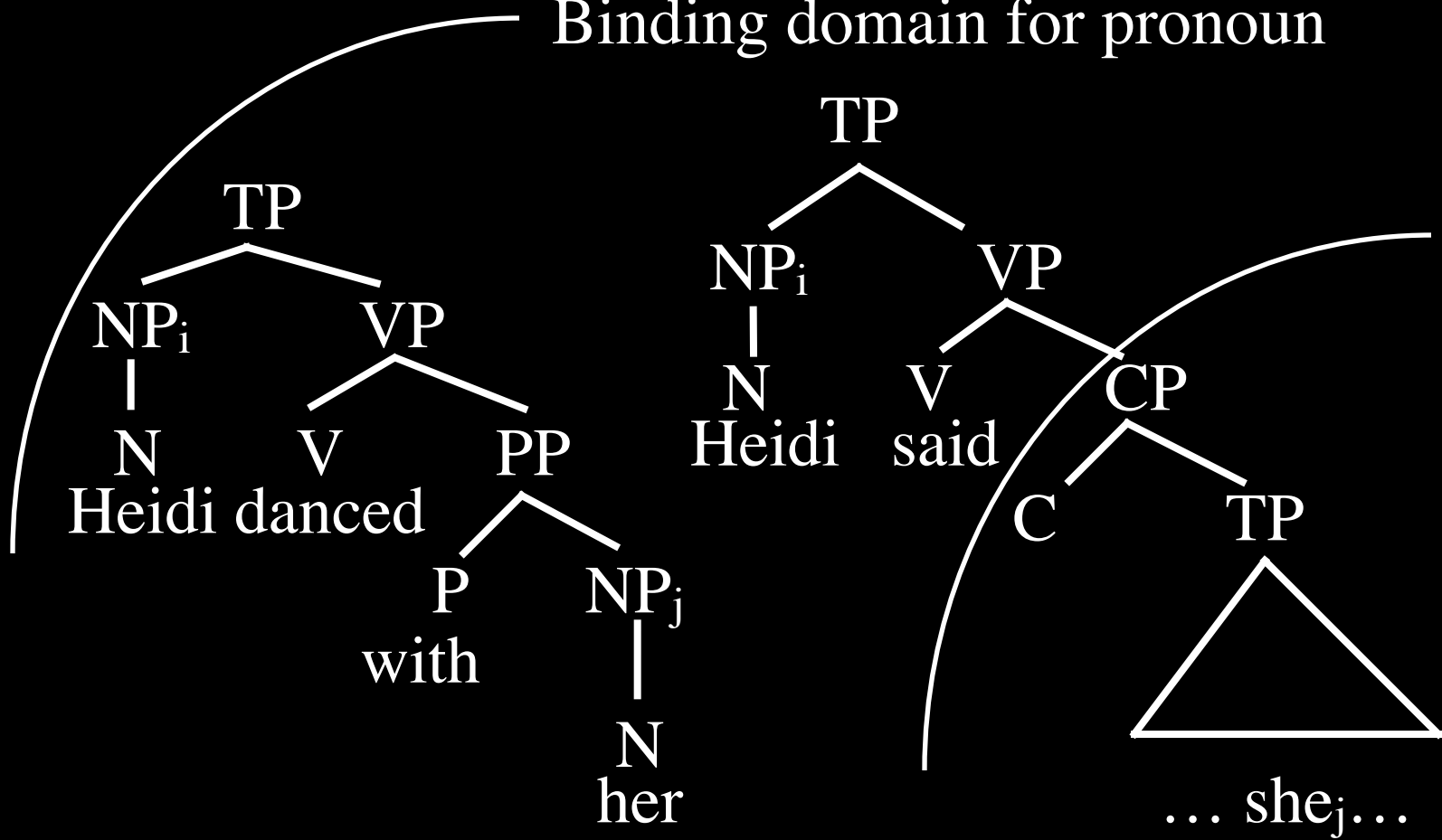


Binding domain

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

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

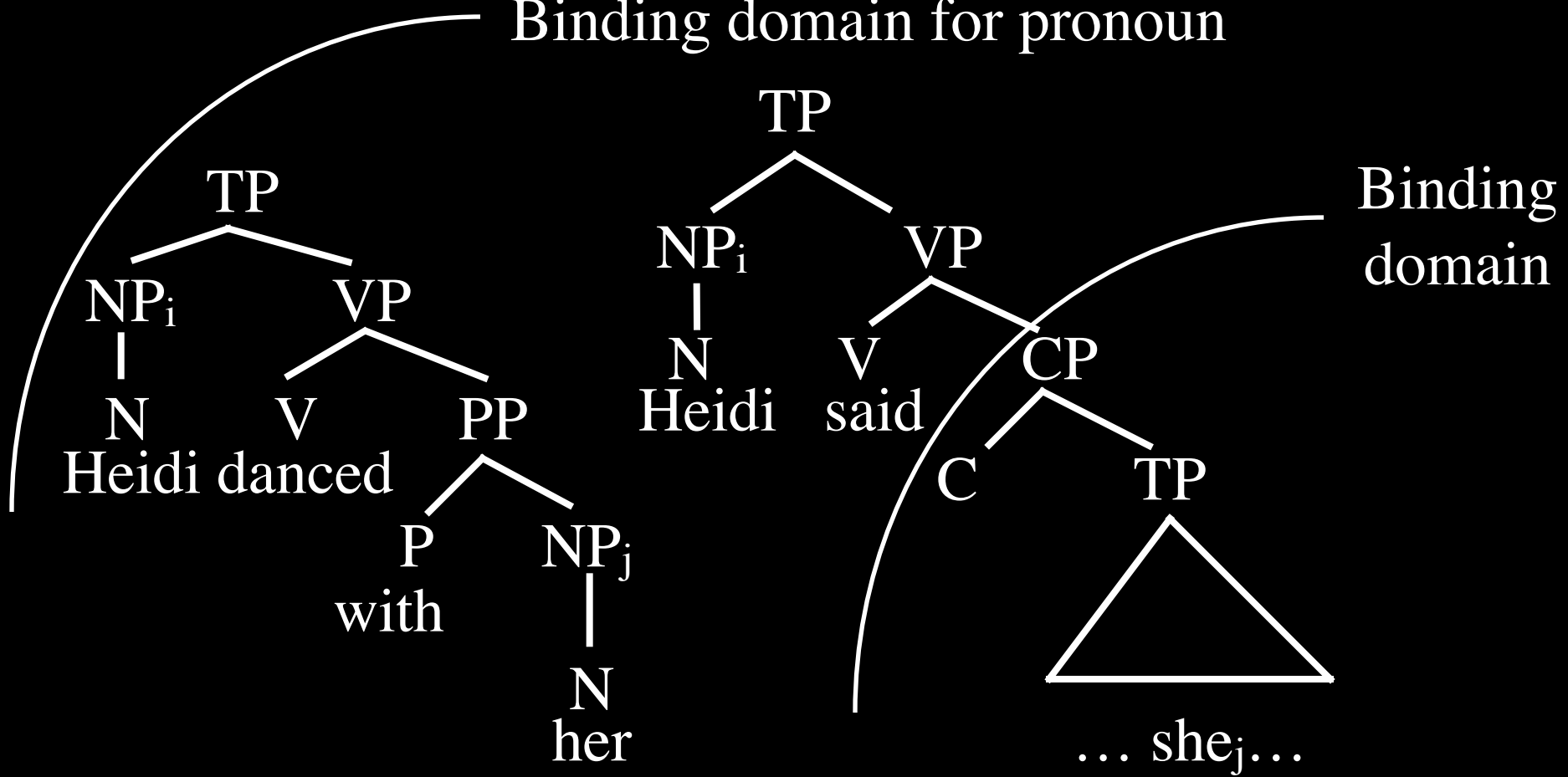
Binding domain for pronoun



Binding domain

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

Binding domain for pronoun



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

Free in domain? **Yes**

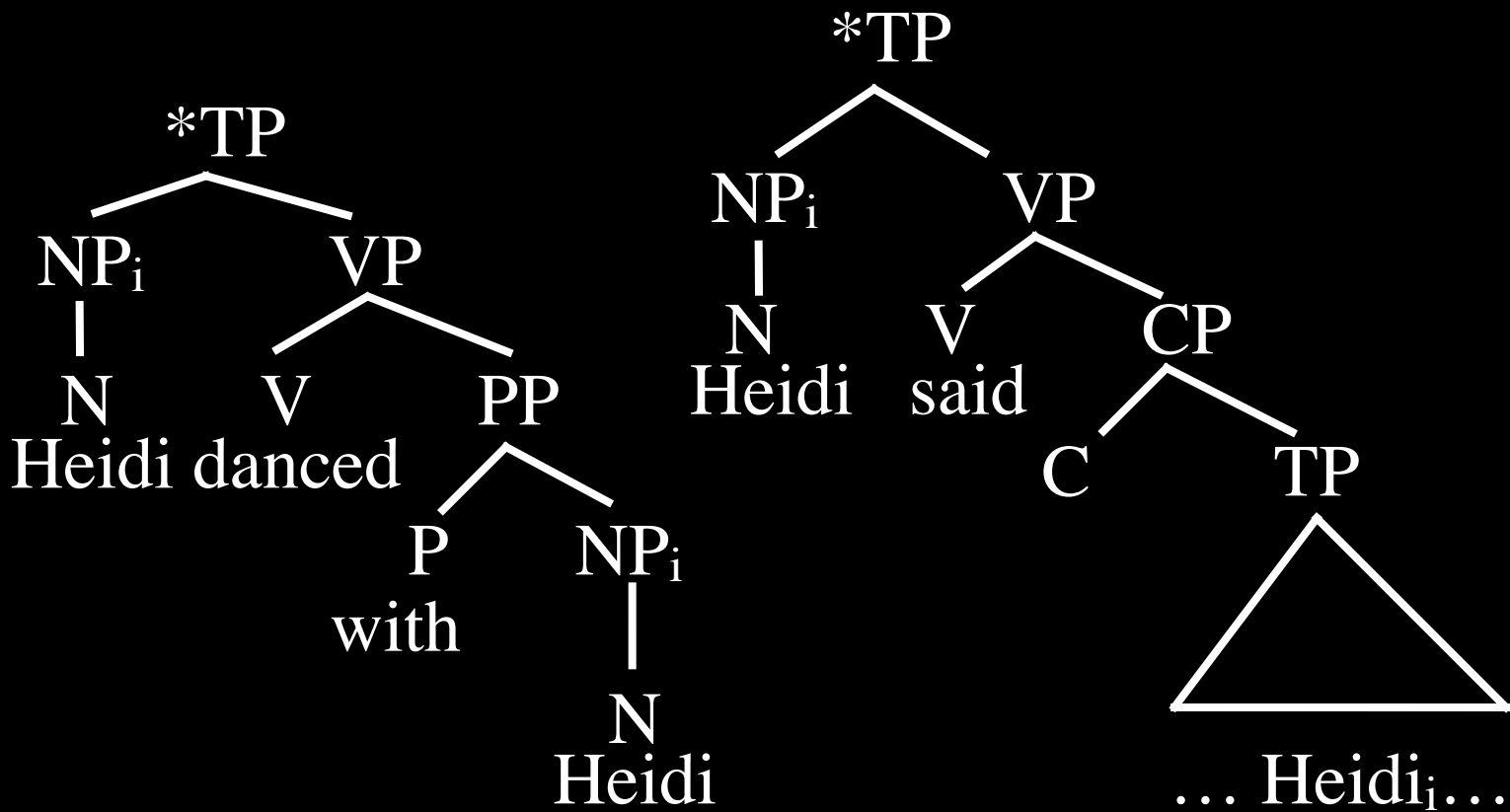
Free in domain? **Yes**

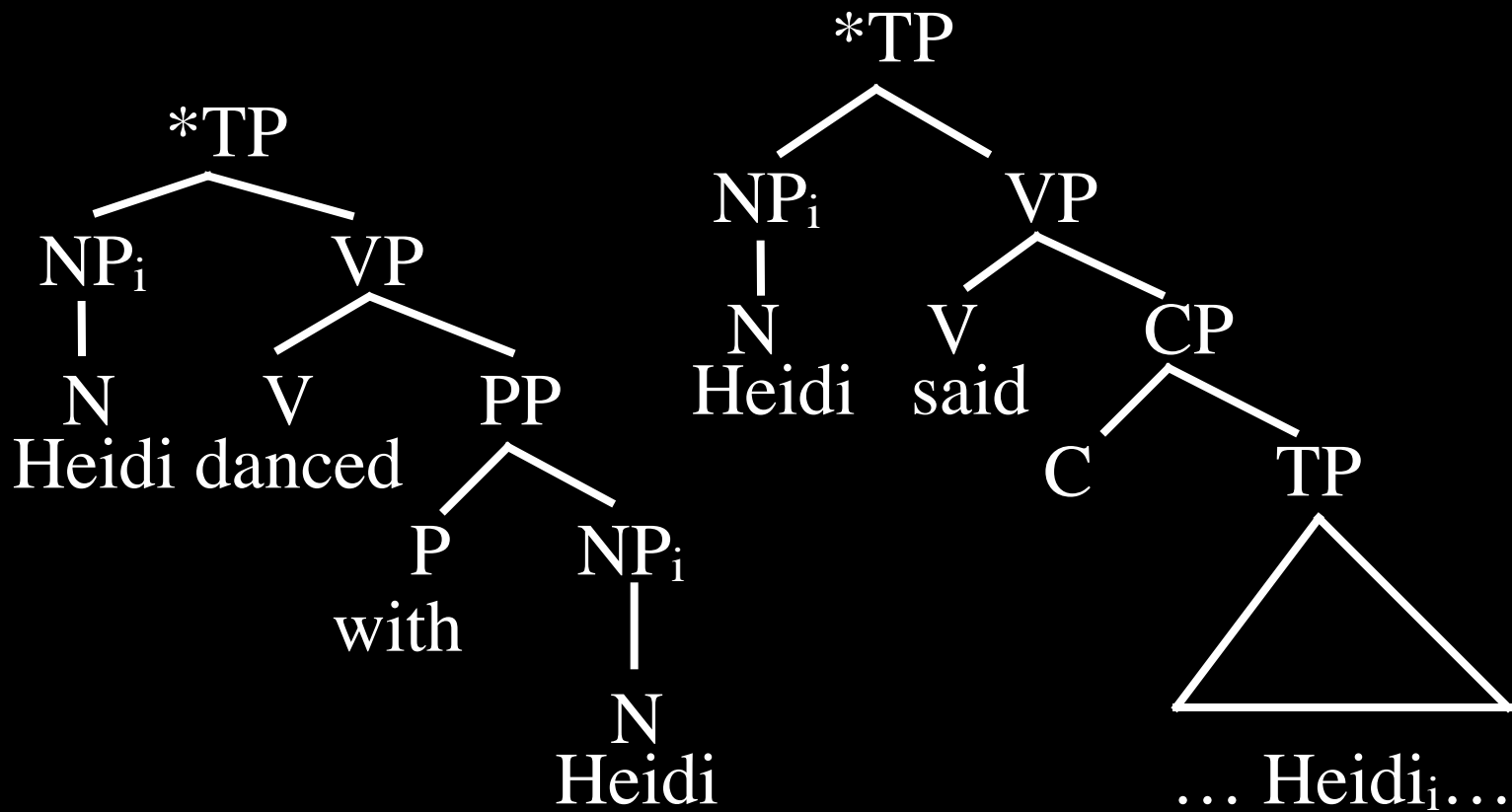
Both meet condition B

# R-expressions

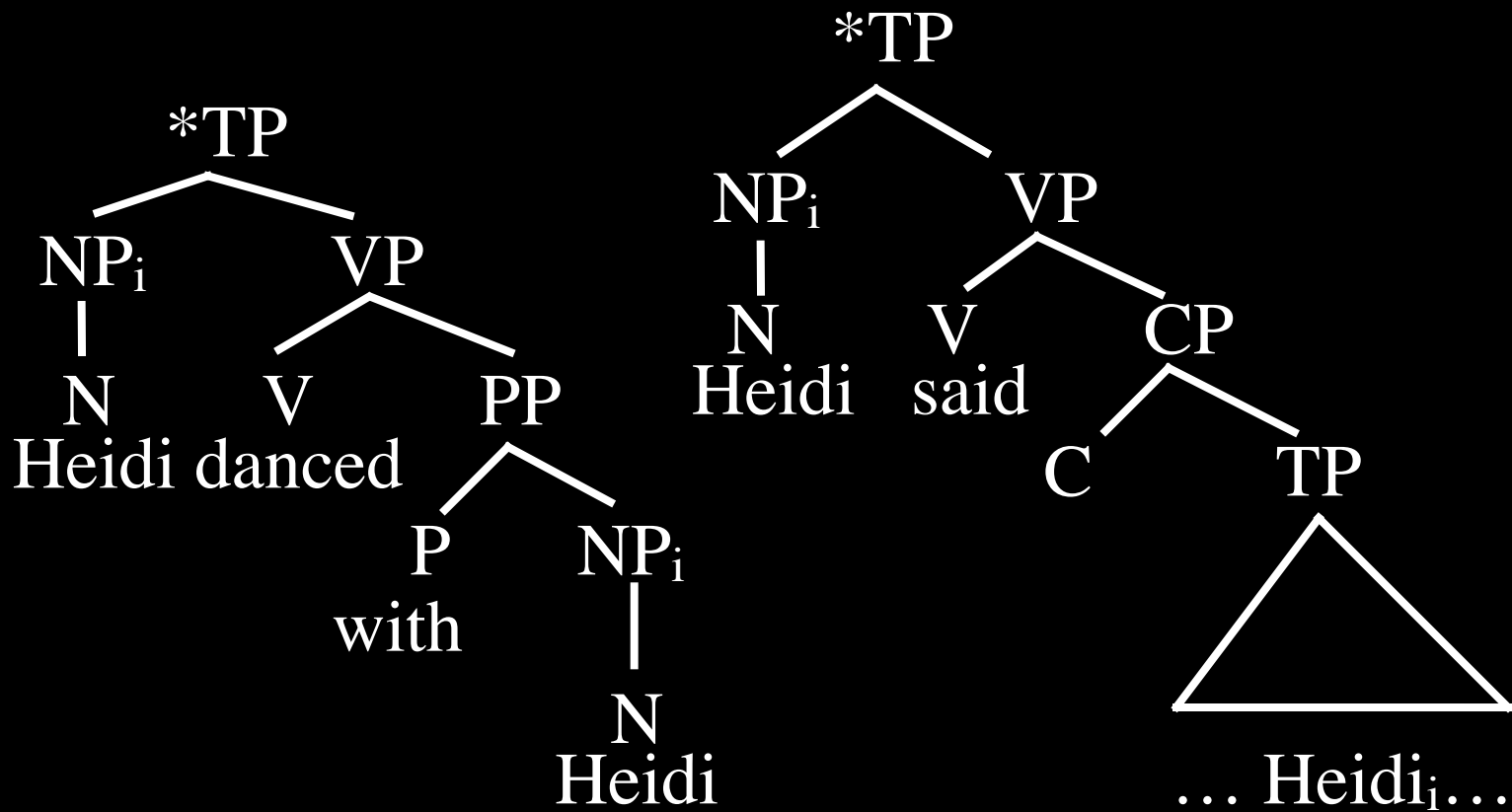
- \*Heidi<sub>i</sub> kissed Miriam<sub>i</sub>
- \*She<sub>i</sub> kissed Heidi<sub>i</sub>
- \*She<sub>i</sub> said that Heidi<sub>i</sub> was a disco queen.
- **Principle C:** R-expressions must be free (everywhere)



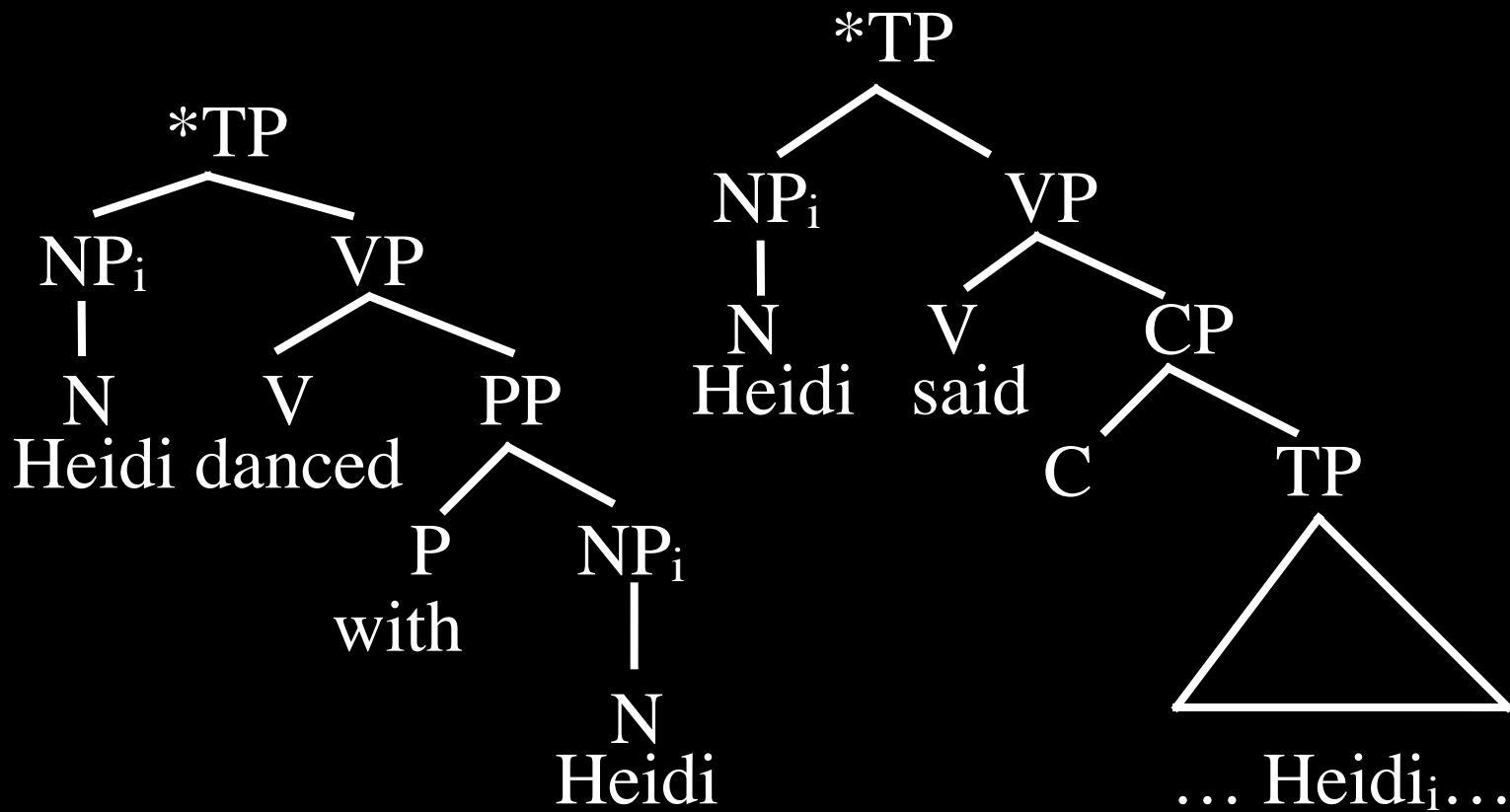




Coindexed?

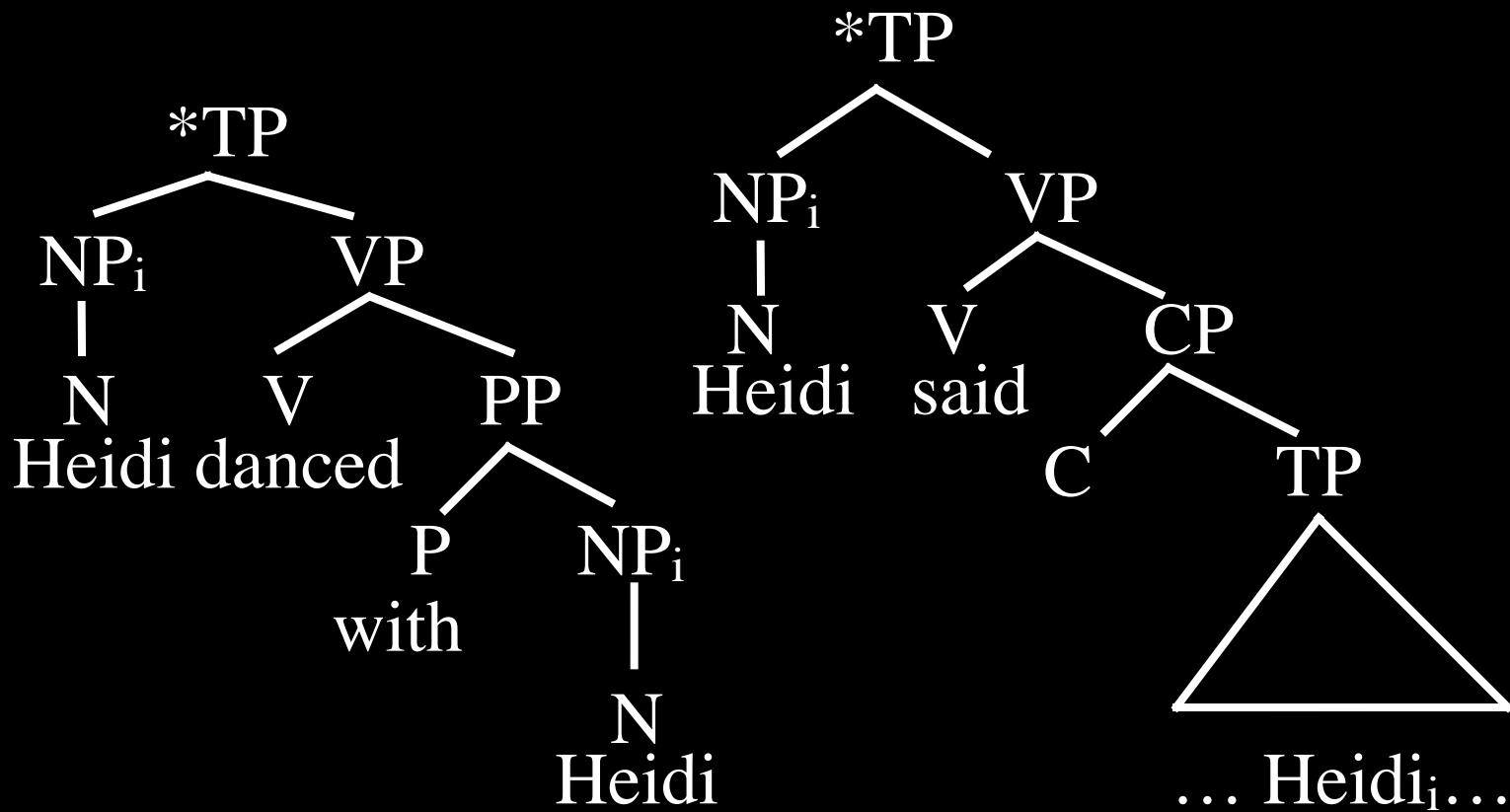


Coindexed? *yes*



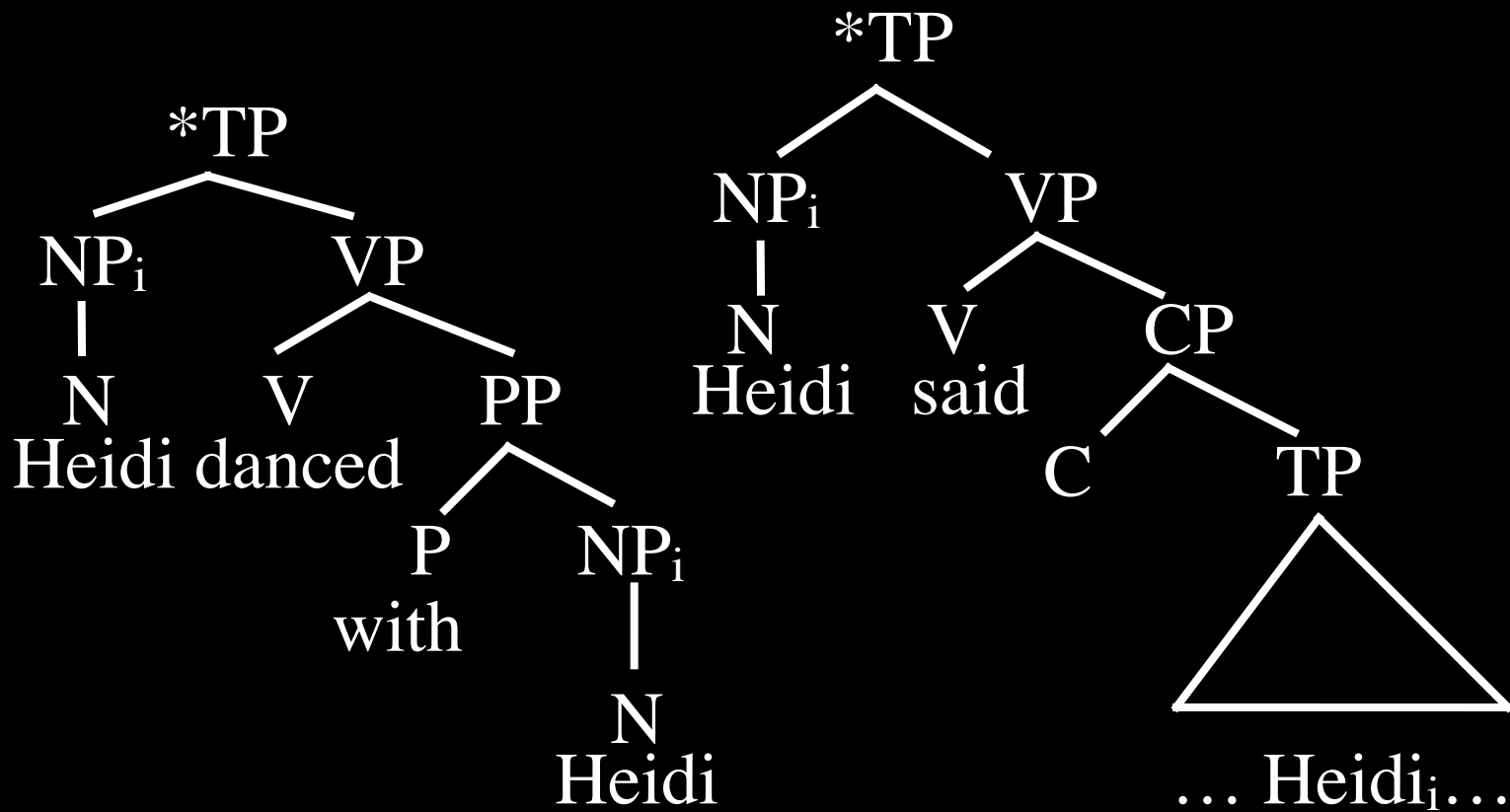
Coindexed? *yes*

C-command?



Coindexed? **yes**

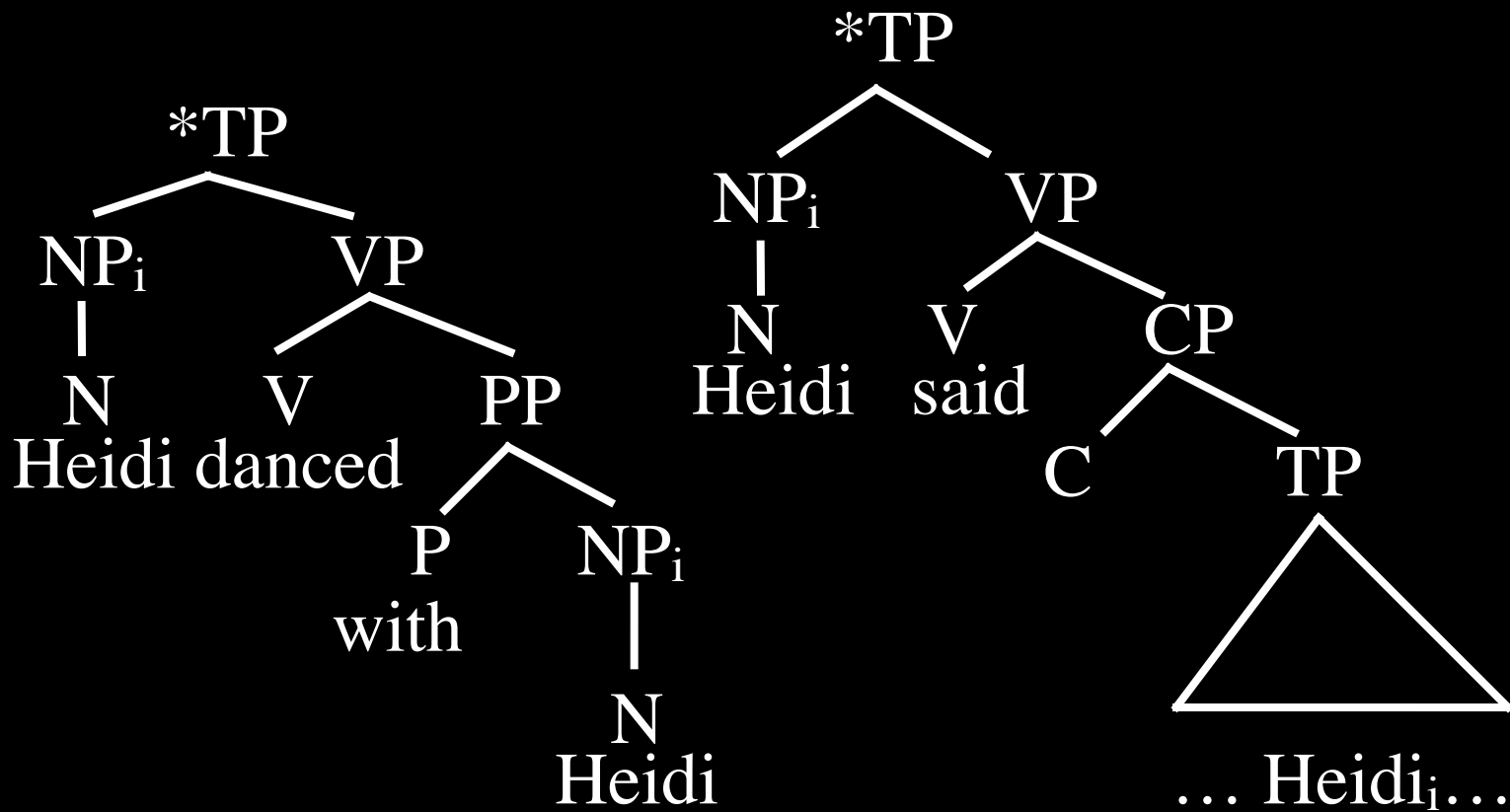
C-command? **yes ∴ Bound**



Coindexed? **yes**

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

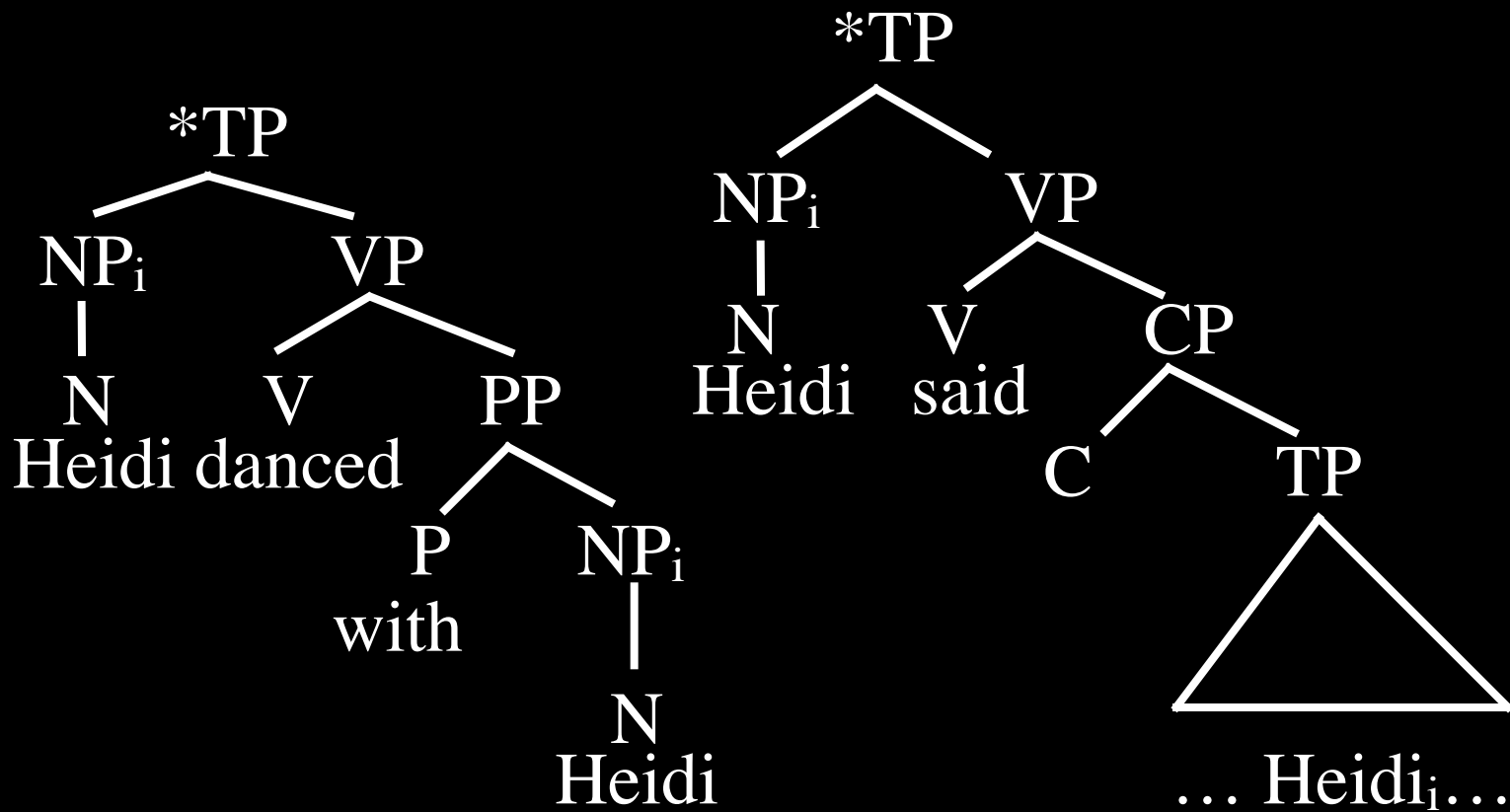
Free?



Coindexed? **yes**

C-command? **yes ∴ Bound**

Free? **no**



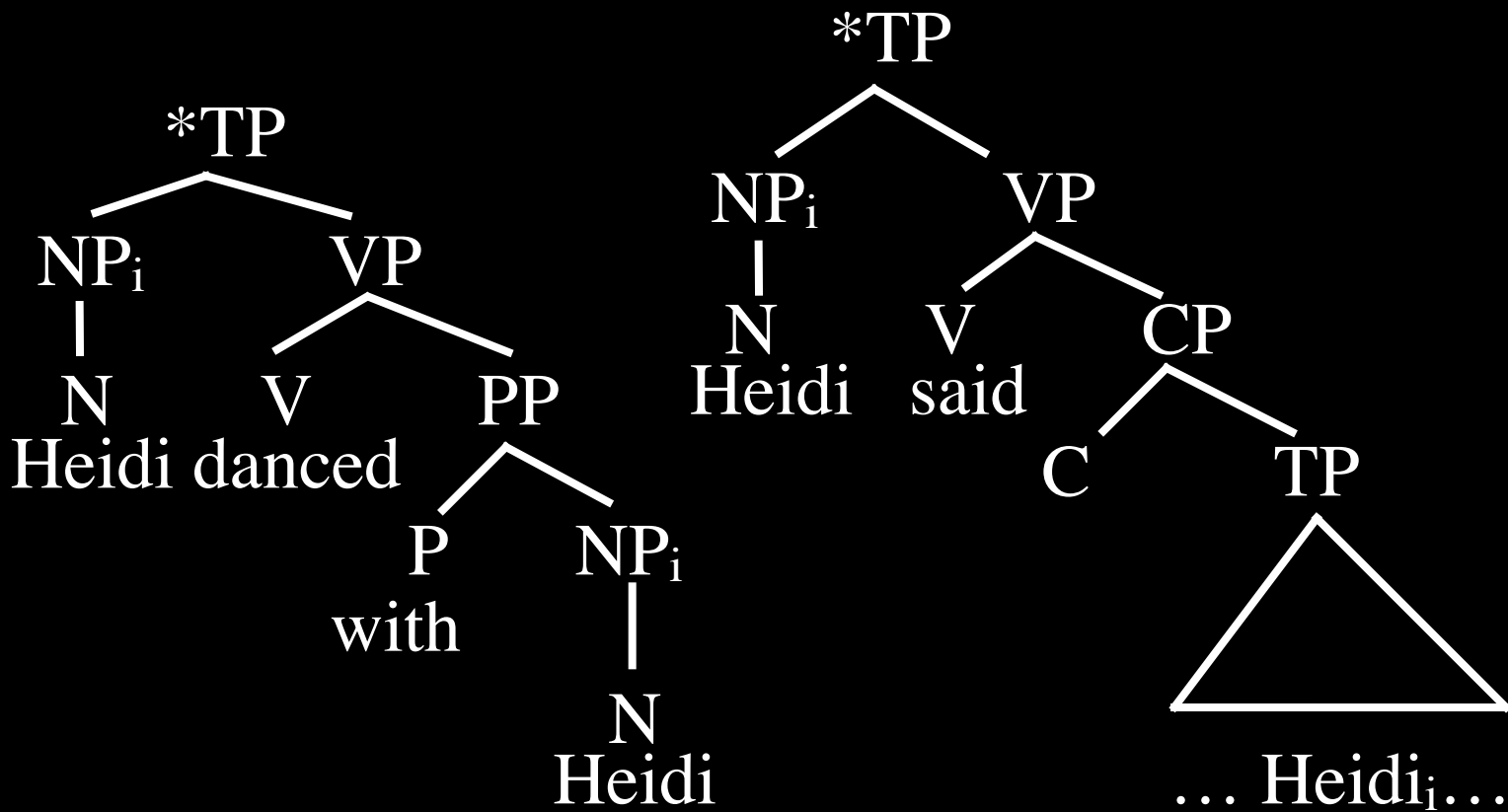
Coindexed? **yes**

C-command? **yes ∴ Bound**

Free? **no**

**VIOLATES PRINCIPLE C**





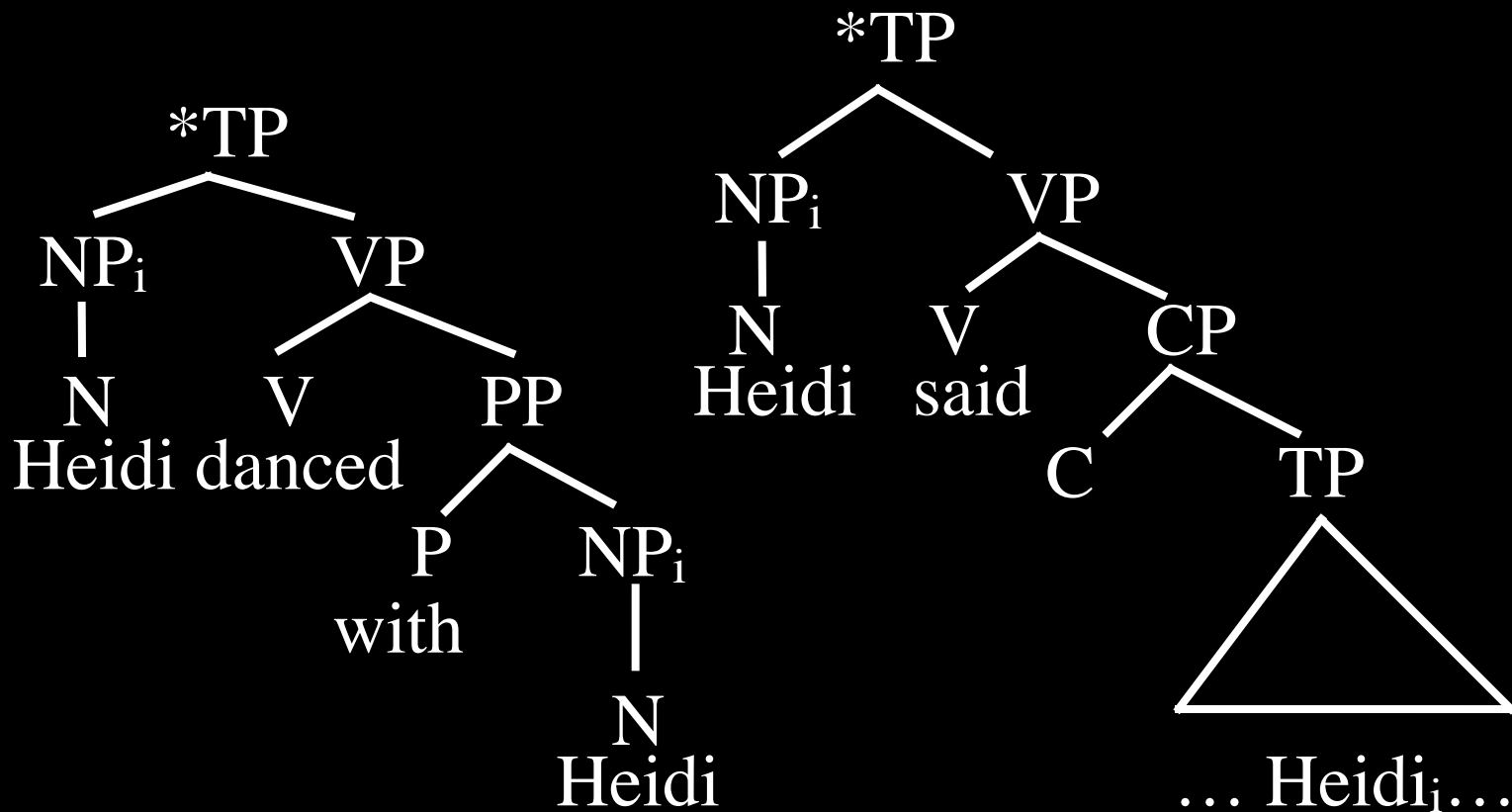
Coindexed? **yes**

Coindexed?

C-command? **yes ∴ Bound**

Free? **no**

**VIOLATES PRINCIPLE C**



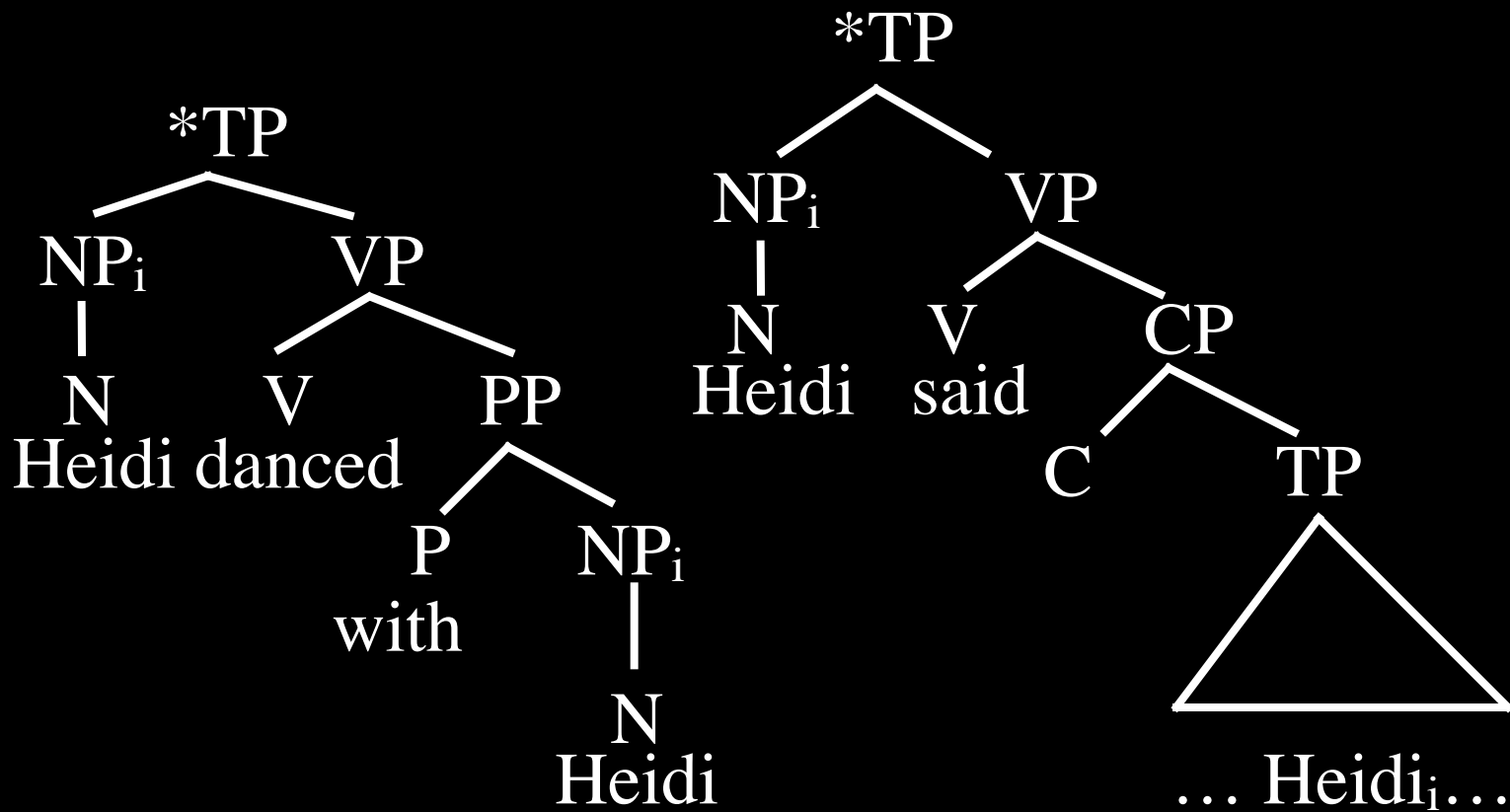
Coindexed? **yes**

Coindexed? **yes**

C-command? **yes ∴ Bound**

Free? **no**

**VIOLATES PRINCIPLE C**



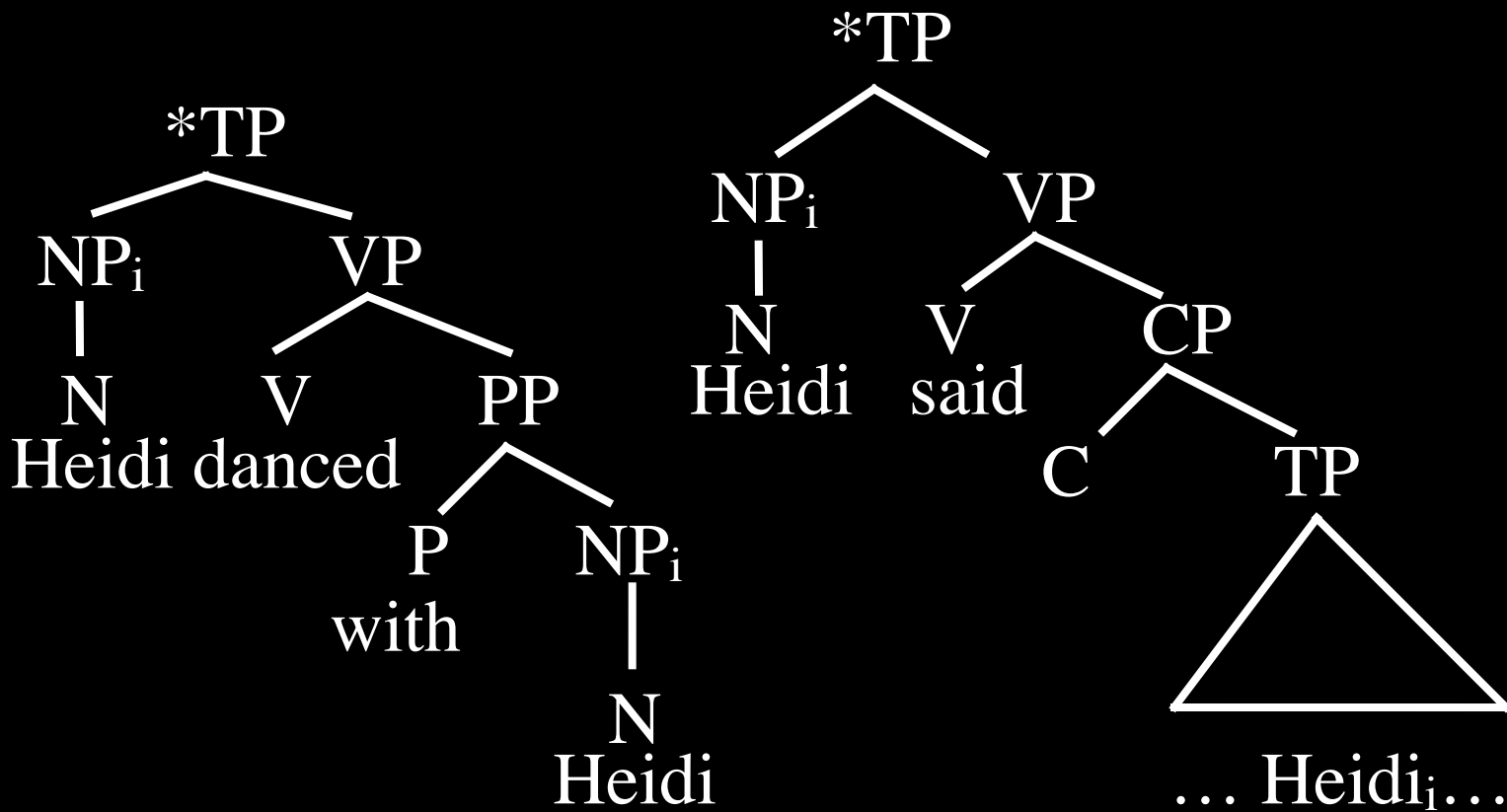
Coindexed? **yes**

Coindexed? **yes**

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

Free? **no**

**VIOLATES PRINCIPLE C**



Coindexed? **yes**

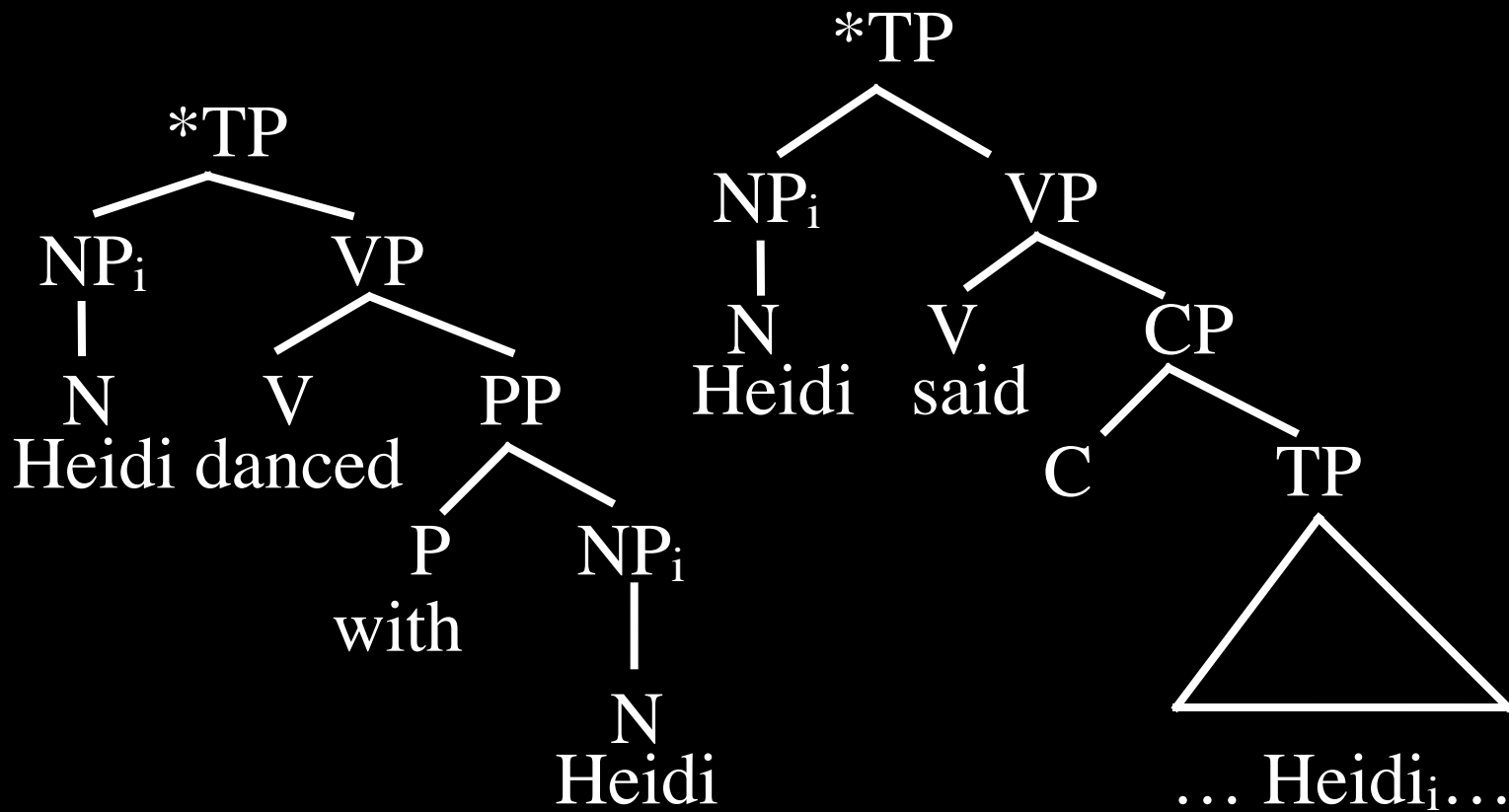
Coindexed? **yes**

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

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

Free? **no**

**VIOLATES PRINCIPLE C**



Coindexed? **yes**

Coindexed? **yes**

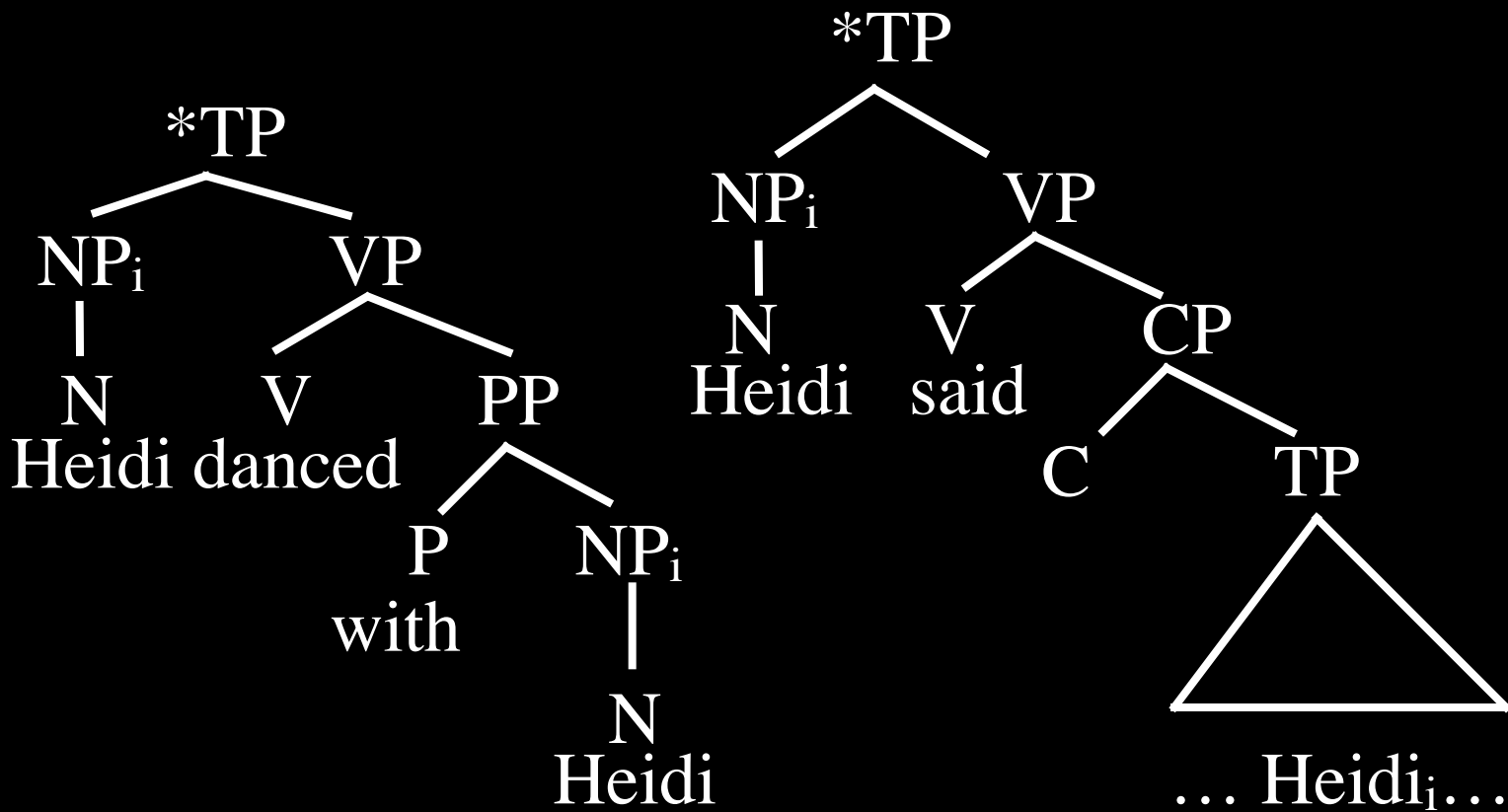
C-command? **yes** ∴ **Bound**

C-command? **yes** ∴ **Bound**

Free? **no**

Free

**VIOLATES PRINCIPLE C**



Coindexed? **yes**

Coindexed? **yes**

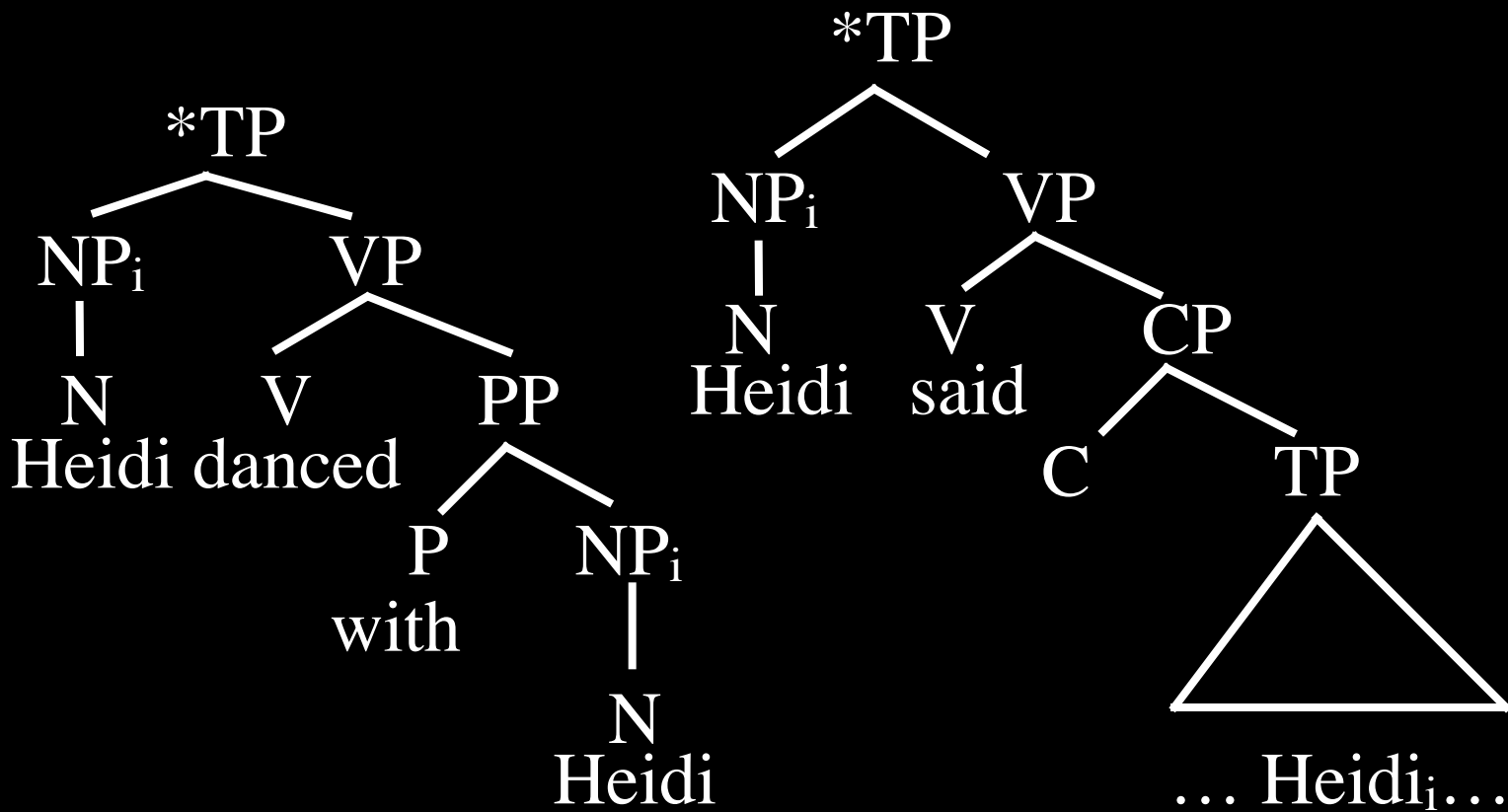
C-command? **yes** ∴ **Bound**

C-command? **yes** ∴ **Bound**

Free? **no**

Free **no**

**VIOLATES PRINCIPLE C**



Coindexed? **yes**

Coindexed? **yes**

C-command? **yes ∴ Bound**

C-command? **yes ∴ Bound**

Free? **no**

Free **no**

**VIOLATES PRINCIPLE C**

**VIOLATES PRINCIPLE C**

# A common confusion

- I often see statements like “The pronoun and the antecedent bind each other”. This is nonsensical.
- Binding is asymmetric. The Antecedent binds the anaphor/pronoun NOT vice versa!



# Another common mistake

- In the sentence:
  - \*He<sub>i</sub> loves Jim<sub>i</sub>
- The antecedent (binder) here is **He** not Jim. That's because He c-commands Jim, not vice versa. Just because Jim is an R-expression does not make it a binder.
- This is a principle C violation.

# Summary

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

- 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