

Syntax

Pavel Caha

27 Sept 2021

Studying syntax

- ▶ Syntax cares about structure, not strings
- ▶ Two consequences:
 - ▶ One string can have multiple meanings (ambiguity)
 - ▶ Different strings can have the same meaning (language variation)
- ▶ Rules of language obey structural – not linear – arrangement

Ambiguity: recap

Nodes and hierarchies

Question Formation in English

Multiple strings: one meaning

Verb Second in German

Verb second cares about hierarchy

Conclusions

Ambiguity

(1) black cab drivers

Ambiguity

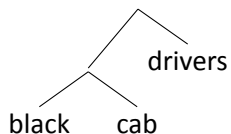
- (1) black cab drivers
 - a. drivers of black cabs

Ambiguity

- (1) black cab drivers
 - a. drivers of black cabs
 - b. cab drivers who are black

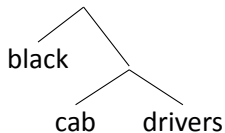
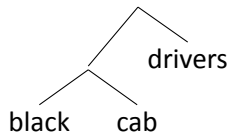
Ambiguity

- (1) black cab drivers
- a. drivers of black cabs
 - b. cab drivers who are black



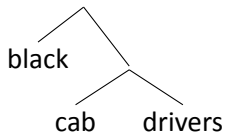
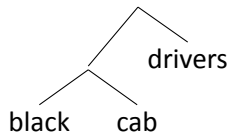
Ambiguity

- (1) black cab drivers
- drivers of black cabs
 - cab drivers who are black

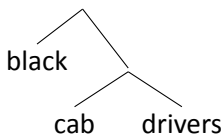
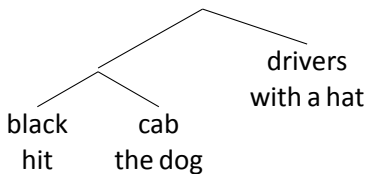


Ambiguity

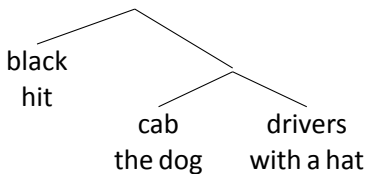
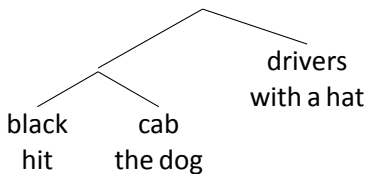
- (2) hit the dog with a hat
- a. the dog has a hat on
 - b. the hat is used to hit the dog



- (3) hit the dog with a hat
- a. the hat is used to hit the dog
 - b. the dog has a hat on



- (4) hit the dog with a hat
- a. the dog has a hat on
 - b. the hat is used to hit the dog



Ambiguity: recap

Nodes and hierarchies

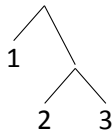
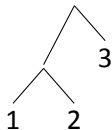
Question Formation in English

Multiple strings: one meaning

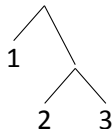
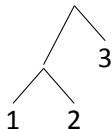
Verb Second in German

Verb second cares about hierarchy

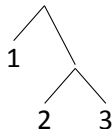
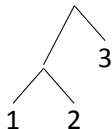
Conclusions



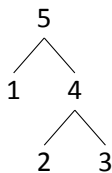
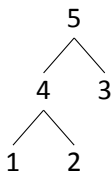
► lines are called edges



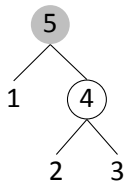
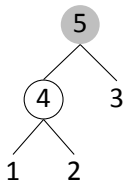
- ▶ lines are called edges
- ▶ at the end of each edge, there is a node



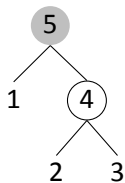
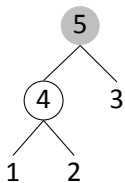
- ▶ lines are called edges
- ▶ at the end of each edge, there is a node
- ▶ 1, 2, 3 are terminal nodes



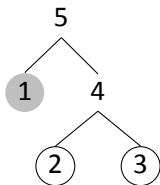
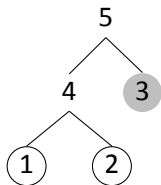
- ▶ lines are called edges
- ▶ at the end of each edge, there is a node
- ▶ 1, 2, 3 are terminal nodes
- ▶ 4, 5 are non-terminal nodes



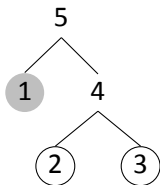
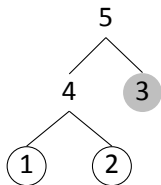
► There is a hierarchy among nodes



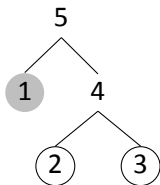
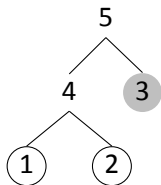
- ▶ There is a hierarchy among nodes
- ▶ 5 is higher than 4 (dominance)



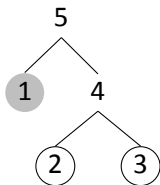
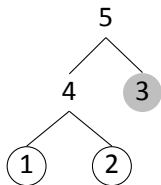
- ▶ in the tree on the left
 - ▶ the terminal 3 is only one edge removed from 5



- ▶ in the tree on the left
 - ▶ the terminal 3 is only one edge removed from 5
 - ▶ 2 and 3 are two edges away

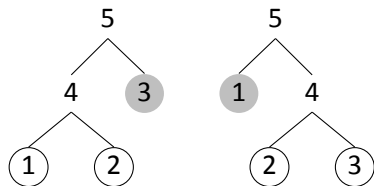


- ▶ in the tree on the left
 - ▶ the terminal 3 is only one edge removed from 5
 - ▶ 2 and 3 are two edges away
 - ▶ 3 is the highest terminal



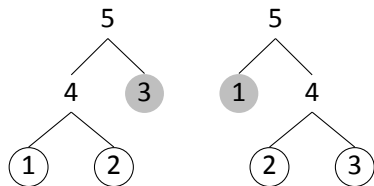
- ▶ in the tree on the left
 - ▶ the terminal 3 is only one edge removed from 5
 - ▶ 2 and 3 are two edges away
 - ▶ 3 is the highest terminal
- ▶ in the tree on the right
 - ▶ 1 is the highest terminal (Every node that dominates 1 dominates also other terminals, but not vice versa)

My point today



- ▶ Languages care about who the highest node is

My point today



- ▶ Languages care about who the highest node is
- ▶ We can see that from the way rules work

Ambiguity: recap

Nodes and hierarchies

Question Formation in English

Multiple strings: one meaning

Verb Second in German

Verb second cares about hierarchy

Conclusions

Question formation

- (5) An example
- a. The murderer has broken the window.

Question formation

(5) An example

- a. The murderer has **broken** the window.
- b. **Has** the murderer **broken** the window?

Question formation

(5) An example

- a. The murderer **has broken** the window.
- b. **Has the murderer broken** the window?

(6) Another example

- a. The murderer **was arrested** last night.

Question formation

(5) An example

- a. The murderer **has broken** the window.
- b. **Has the murderer broken** the window?

(6) Another example

- a. The murderer **was arrested** last night.
- b. **Was the murderer arrested** last night?

Question formation

- (5) An example
 - a. The murderer **has broken** the window.
 - b. **Has the murderer broken** the window?
- (6) Another example
 - a. The murderer **was arrested** last night.
 - b. **Was the murderer arrested** last night?
- (7) The pattern
 - a. Declarative: **Subject Auxiliary main verb ...**

Question formation

- (5) An example
 - a. The murderer **has** **broken** the window.
 - b. **Has** the murderer **broken** the window?
- (6) Another example
 - a. The murderer **was** **arrested** last night.
 - b. **Was** the murderer **arrested** last night?
- (7) The pattern
 - a. Declarative: **Subject** **Auxiliary** **main verb** ...
 - b. Interrogative: **Auxiliary** **Subject** **main verb** ...

Question formation in English

- (8) The pattern
- a. Declarative: **Subject** **Auxiliary** **main verb**...
 - b. Interrogative: **Auxiliary** **Subject** **main verb**...

Question formation in English

- (8) The pattern
- a. Declarative: **Subject** **Auxiliary** **main verb**...
 - b. Interrogative: **Auxiliary** **Subject** **main verb**...
- (9) Two hypotheses:

- a. **Auxiliary** **subject** **Auxiliary** **main verb**
- 

Question formation in English

(8) The pattern

- a. Declarative: **Subject** **Auxiliary** **main verb**...
- b. Interrogative: **Auxiliary** **Subject** **main verb**...

(9) Two hypotheses:

- a. **Auxiliary** **subject** **Auxiliary** **main verb**
 - b. **subject** **Auxiliary** **subject** **main verb**
-

Question formation in English

- (8) The pattern
- a. Declarative: **Subject** **Auxiliary** **main verb**...
 - b. Interrogative: **Auxiliary** **Subject** **main verb**...

(9) Two hypotheses:

- a. **Auxiliary** **subject** **Auxiliary** **main verb**
 - b. **subject** **Auxiliary** **subject** **main verb**
-

- (10) a. **These new shops** definitely **are** doing well.

Question formation in English

- (8) The pattern
- Declarative: **Subject** **Auxiliary** **main verb**...
 - Interrogative: **Auxiliary** **Subject** **main verb**...

(9) Two hypotheses:

- Auxiliary** **subject** **Auxiliary** **main verb**
 - subject** **Auxiliary** **subject** **main verb**
-

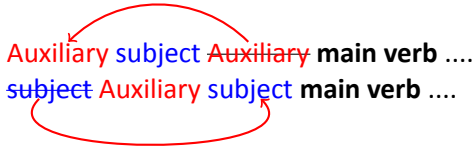
- (10)
- These new shops** definitely **are** doing well.
 - Are these new shops** definitely — doing well?

Question formation in English

(8) The pattern

- a. Declarative: **Subject Auxiliary main verb...**
- b. Interrogative: **Auxiliary Subject main verb...**

(9) Two hypotheses:

- a. **Auxiliary subject Auxiliary main verb**
 - b. **subject Auxiliary subject main verb**
- 

- (10)
- a. **These new shops** definitely **are** doing well.
 - b. **Are these new shops** definitely — doing well?
 - c. *Definitely **are these new shops** doing well.

(11) a. The man who is tall is happy.

- (11) a. The man who is tall is happy.
b. The man who is tall is happy.

- (11)
- a. The man who is tall is happy.
 - b. The man who is tall is happy.
 - c. *Is The man who — tall is happy?

- (11)
- a. The man who is tall is happy.
 - b. The man who is tall is happy.
 - c. *Is The man who — tall is happy?
 - d. Is The man who is tall — happy?

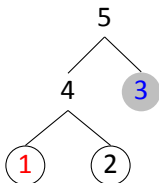
- (11) a. The man who is tall is happy.
b. The man who is tall is happy.
c. *Is The man who — tall is happy?
d. Is The man who is tall — happy?

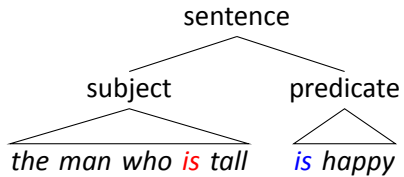
(12) The moving element is closest *in terms of structural distance*

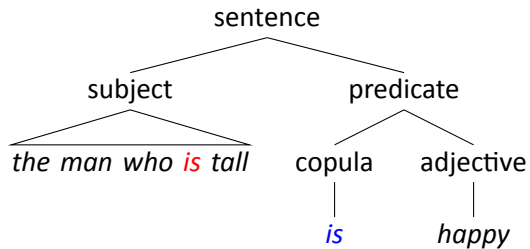
- (11) a. The man who is tall is happy.
b. The man who is tall is happy.
c. *Is The man who — tall is happy?
d. Is The man who is tall — happy?

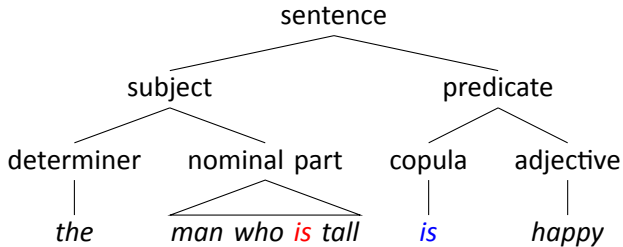
(12) The moving element is closest *in terms of structural distance*

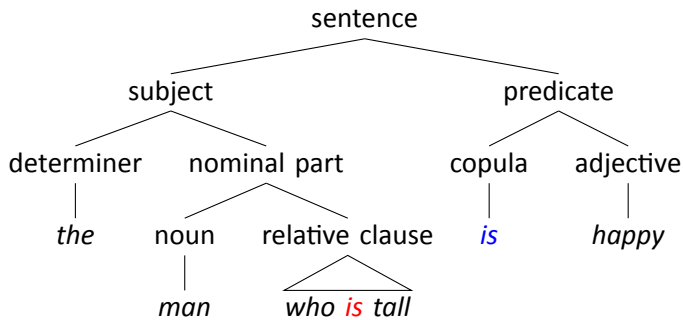
(13)

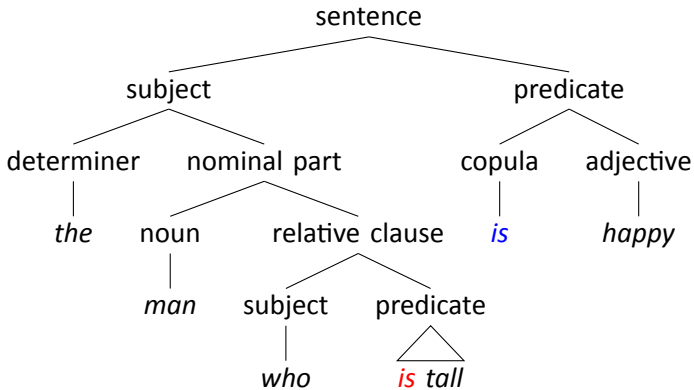


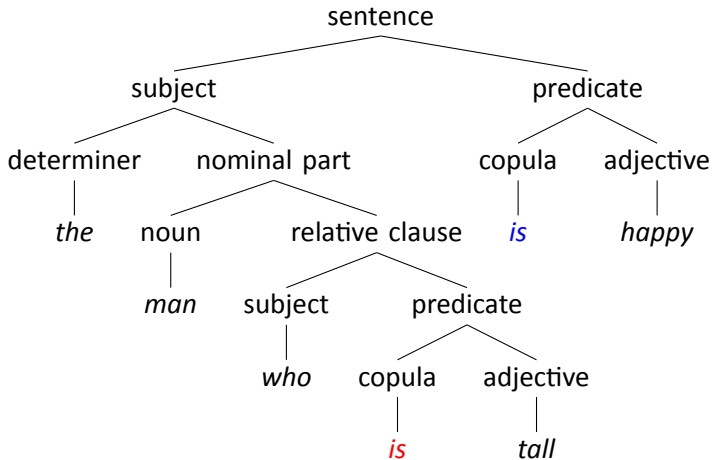


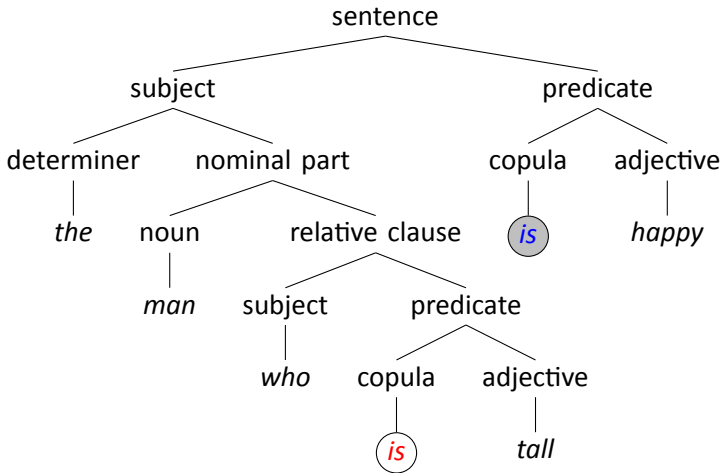












Ambiguity: recap

Nodes and hierarchies

Question Formation in English

Multiple strings: one meaning

Verb Second in German

Verb second cares about hierarchy

Conclusions

(14) a. $(3 + 2) + 5 = 10$

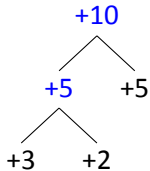
(14) a. $(3 + 2) + 5 = 10$

b. $(2 + 3) + 5 = 10$

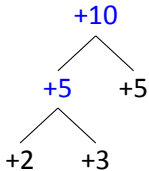
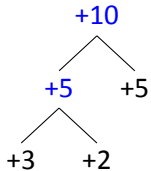
- (14)
- a. $(3 + 2) + 5 = 10$
 - b. $(2 + 3) + 5 = 10$
 - c. $5 + (3 + 2) = 10$

- (14)
- a. $(3 + 2) + 5 = 10$
 - b. $(2 + 3) + 5 = 10$
 - c. $5 + (3 + 2) = 10$
 - d. $5 + (2 + 3) = 10$

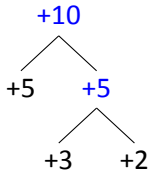
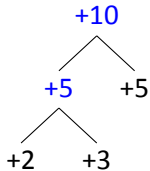
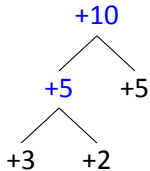
- (14) a. $(3 + 2) + 5 = 10$
b. $(2 + 3) + 5 = 10$
c. $5 + (3 + 2) = 10$
d. $5 + (2 + 3) = 10$



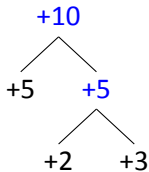
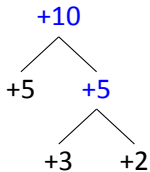
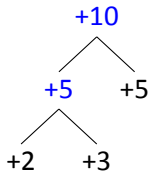
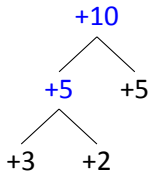
- (14) a. $(3 + 2) + 5 = 10$
b. $(2 + 3) + 5 = 10$
c. $5 + (3 + 2) = 10$
d. $5 + (2 + 3) = 10$



- (14) a. $(3 + 2) + 5 = 10$
b. $(2 + 3) + 5 = 10$
c. $5 + (3 + 2) = 10$
d. $5 + (2 + 3) = 10$



- (14) a. $(3 + 2) + 5 = 10$
b. $(2 + 3) + 5 = 10$
c. $5 + (3 + 2) = 10$
d. $5 + (2 + 3) = 10$



(15) SVO vs. SOV

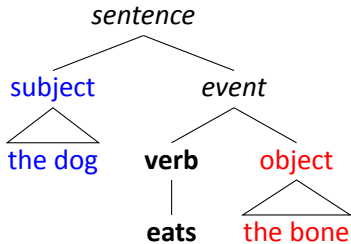
a. (Hans says that) **the dog** **eats** **the bone**

(15) SVO vs. SOV

- a. (Hans says that) **the dog eats the bone**
- b. (Hans sagt dass) **der Hund den Knochen frisst.**
Hans said that the dog the.ACC bone.ACC eats
'(Hans says) that the dog eats the bone.'

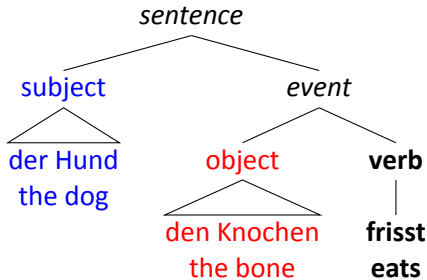
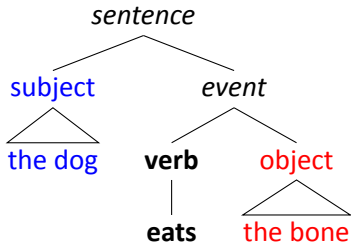
(15) SVO vs. SOV

- a. (Hans says that) **the dog eats the bone**
- b. (Hans sagt dass) **der Hund den Knochen frisst.**
Hans said that the dog the.ACC bone.ACC eats
'(Hans says) that the dog eats the bone.'



(15) SVO vs. SOV

- a. (Hans says that) **the dog eats the bone**
- b. (Hans sagt dass) **der Hund den Knochen frisst.**
Hans said that the dog the.ACC bone.ACC eats
'(Hans says) that the dog eats the bone.'



Ambiguity: recap

Nodes and hierarchies

Question Formation in English

Multiple strings: one meaning

Verb Second in German

Verb second cares about hierarchy

Conclusions

(16) Hans sagt...

- a. ... dass **der Hund** **den** **Knochen** **frisst**.
... that the dog the.ACC bone.ACC eats
'(Hans says) that the dog eats the bone.'

(16) Hans sagt...

- a. ... dass **der Hund** **den** **Knochen** **frisst**.
... that the dog the.ACC bone.ACC eats
'(Hans says) that the dog eats the bone.'
- b. **Der Hund** **frisst** **den** **Knochen**.
the dog eats the.ACC bone.ACC
'The dog eats the bone.'

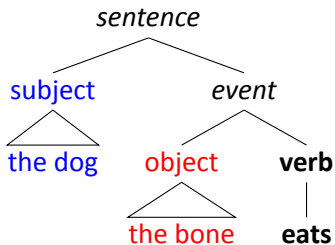
(16) Hans sagt...

a. ... dass **der Hund** **den** **Knochen** **frisst**.

... that the dog the.ACC bone.ACC eats
'(Hans says) that the dog eats the bone.'

b. **Der Hund** **frisst** **den** **Knochen**.

the dog eats the.ACC bone.ACC
'The dog eats the bone.'



(16) Hans sagt...

a. ... dass **der Hund** **den Knochen** **frisst**.

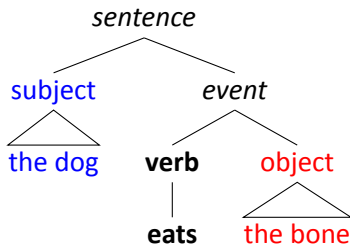
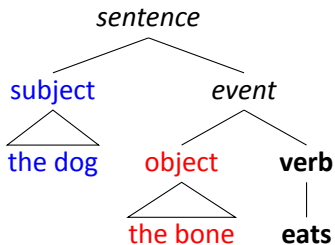
... that the dog the.ACC bone.ACC eats

'(Hans says) that the dog eats the bone.'

b. **Der Hund** **frisst** **den Knochen**.

the dog eats the.ACC bone.ACC

'The dog eats the bone.'



(16) Hans sagt...

a. ... dass **der Hund** **den Knochen** **frisst**.

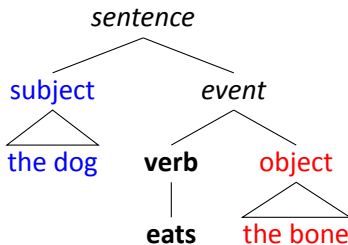
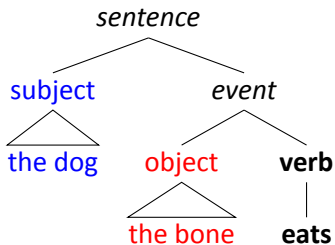
... that the dog the.ACC bone.ACC eats

'(Hans says) that the dog eats the bone.'

b. **Der Hund** **frisst** **den Knochen**.

the dog eats the.ACC bone.ACC

'The dog eats the bone.'



► But this can't be the right analysis.

Verb second

- (17) a. **Der Patient mag den Doktor.**
The patient likes the doctor

Verb second

- (17) a. **Der Patient mag den Doktor.**
The patient likes the doctor
- b. 'Perhaps **the patient likes the doctor.**'

Verb second

- (17) a. **Der Patient mag den Doktor.**
The patient likes the doctor
- b. 'Perhaps **the patient likes the doctor.**'
- c. **Vielleicht mag Der Patient den Doktor.**
Perhaps likes the patient the doctor

Verb second

- (17) a. **Der Patient mag den Doktor.**
The patient likes the doctor
- b. 'Perhaps **the patient likes the doctor.**'
- c. Vielleicht **mag Der Patient den Doktor.**
Perhaps likes the patient the doctor
- (18) Verb second:

TOPIC **verb** Subject Object **verb**



Discourse linking (topic, focus)

- (19) a. Topic: the question under discussion (previously mentioned information)

Discourse linking (topic, focus)

- (19)
- a. Topic: the question under discussion (previously mentioned information)
 - b. Focus: The answer to that question (new information)

Discourse linking (topic, focus)

- (19)
 - a. Topic: the question under discussion (previously mentioned information)
 - b. Focus: The answer to that question (new information)
- (20) Neutral word order (everything is new)
 - a. What's the news in the world?
 - b. It is snowing in the Alps.

Discourse linking (topic, focus)

- (19) a. Topic: the question under discussion (previously mentioned information)
b. Focus: The answer to that question (new information)
- (20) Neutral word order (everything is new)
 - a. What's the news in the world?
 - b. It is snowing in the Alps.
- (21) Contrastive topic
 - a. Is there snow in Krkonoše? (introducing topic)

Discourse linking (topic, focus)

- (19) a. Topic: the question under discussion (previously mentioned information)
b. Focus: The answer to that question (new information)
- (20) Neutral word order (everything is new)
a. What's the news in the world?
b. It is snowing in the Alps.
- (21) Contrastive topic
a. Is there snow in Krkonoše? (introducing topic)
b. No, there is **NO** snow in Krkonoše.
(Krkonoše is the topic, you can't stress it)

Discourse linking (topic, focus)

- (19) a. Topic: the question under discussion (previously mentioned information)
b. Focus: The answer to that question (new information)
- (20) Neutral word order (everything is new)
a. What's the news in the world?
b. It is snowing in the Alps.
- (21) Contrastive topic
a. Is there snow in Krkonoše? (introducing topic)
b. No, there is **NO** snow in Krkonoše.
(Krkonoše is the topic, you can't stress it)
c. ... but **IN THE ALPS**, there is some.
(Alps = contrastive topic, it has stress, it is first)

- (22) The verb second property
- a. Es **schneit** auf der Alb.
it snows on the Alb
'It is snowing on the Alb.'

- (22) The verb second property
- a. Es **schneit** auf der Alb.
it snows on the Alb
'It is snowing on the Alb.'
 - b. Auf der Alb **schneit** es.
on the Alb snows it
'On the Alb, it is snowing.'

- (22) The verb second property
- a. Es **schneit** auf der Alb.
it snows on the Alb
'It is snowing on the Alb.'
 - b. Auf der Alb **schneit** es.
on the Alb snows it
'On the Alb, it is snowing.'
 - c. In the Alps, it is snowing.

- (22) The verb second property
- a. Es **schneit** auf der Alb.
it snows on the Alb
'It is snowing on the Alb.'
 - b. Auf der Alb **schneit** es.
on the Alb snows it
'On the Alb, it is snowing.'
 - c. In the Alps, it is snowing.

- ▶ Second place phenomena will be important (Czech has clitic second)

The verb moves

(23) Verb second:

TOPIC **verb** Subject Object **verb**

A red curved arrow originates from the second 'verb' in the sequence and points to the first 'verb', illustrating the movement of the verb to the second position.

An argument

- (24) a. Er sagte, dass er morgen komme.
he said that he tomorrow comes
'He said that he was going to come the day after.'

An argument

- (24) a. Er sagte, dass **er morgen komme**.
he said that he tomorrow comes
'He said that he was going to come the day after.'
- b. Er sagte, **er komme morgen**.
He said he comes tomorrow
'He said that he was going to come the day after.'


An argument

- (24) a. Er sagte, dass **er morgen komme**.
he said that he tomorrow comes
'He said that he was going to come the day after.'
- b. Er sagte, **er komme morgen**.
He said he comes tomorrow
'He said that he was going to come the day after.'
- c. *Er sagte, dass **er komme morgen**.
He said that he comes tomorrow

An argument

- (24) a. Er sagte, dass **er morgen komme**.
he said that he tomorrow comes
'He said that he was going to come the day after.'
- b. Er sagte, **er komme morgen**.
He said he comes tomorrow
'He said that he was going to come the day after.'
- c. *Er sagte, dass **er komme morgen**.
He said that he comes tomorrow
- (25) Verb second:

TOPIC !!**complementizer**!! **Subject** **Object** **verb**



Supporting evidence

- (26) Verb movement leads to verb splitting
- a. ..., dass **Hans** **das** **Kind** **ab-holt**.
... that Hans the.ACC child.ACC up-picks
'..., that Hans picks up the child.'

Supporting evidence

- (26) Verb movement leads to verb splitting
- a. ..., dass **Hans** **das** **Kind** **ab-holt**.
... that Hans the.ACC child.ACC up-picks
'..., that Hans picks up the child.'
- b. **Hans** **holt** **das** **Kind** **ab**.
Hans picks the.ACC child.ACC up
'Hans picks up the child.'

Supporting evidence

- (26) Verb movement leads to verb splitting
- a. ..., dass **Hans** **das** **Kind** **ab-holt**.
... that Hans the.ACC child.ACC up-picks
'..., that Hans picks up the child.'
- b. **Hans** **holt** **das** **Kind** **ab**.
Hans picks the.ACC child.ACC up
'Hans picks up the child.'

- (27) Verb second:

TOPIC **verb** **Subject** **Object** **particle-verb**



Ambiguity: recap

Nodes and hierarchies

Question Formation in English

Multiple strings: one meaning

Verb Second in German

Verb second cares about hierarchy

Conclusions

Multiple verbs

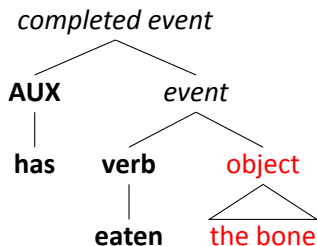
(28) a. ... because **the dog** **has eaten** **the bone**

Multiple verbs

- (28) a. ... because **the dog** **has eaten** **the bone**
b. ... weil **der Hund** **den Knochen** **gefressen hat.**
... because the dog the.ACC bone.ACC eaten has
'..., because the dog has eaten the bone.'

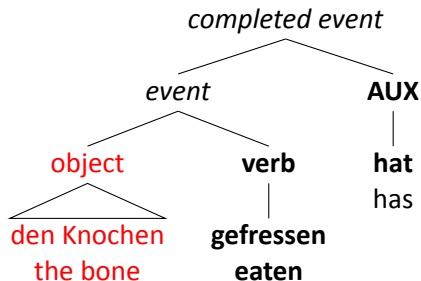
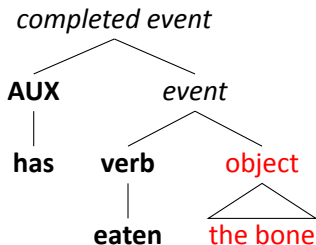
Multiple verbs

- (28) a. ... because **the dog has eaten the bone**
b. ... weil **der Hund den Knochen gefressen hat.**
... because the dog the.ACC bone.ACC eaten has
'..., because the dog has eaten the bone.'



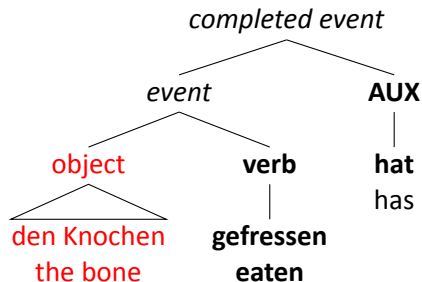
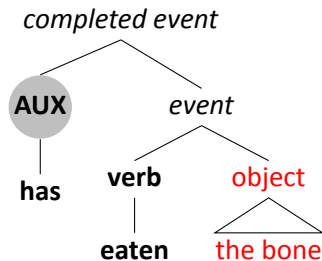
Multiple verbs

- (28) a. ... because **the dog** **has eaten** **the bone**
b. ... weil **der Hund** **den Knochen** **gefressen hat**.
... because the dog the.ACC bone.ACC eaten has
'..., because the dog has eaten the bone.'



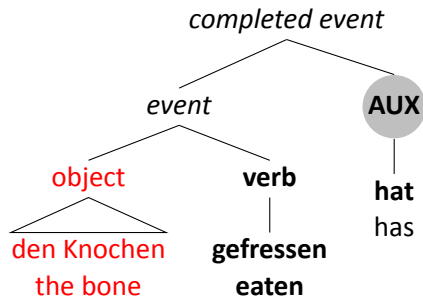
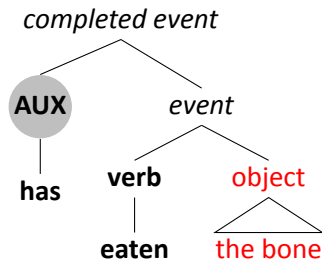
Multiple verbs

- (29) a. ... because **the dog** **has eaten** **the bone**
b. ... weil **der Hund** **den Knochen** **gefressen hat**.
... because the dog the.ACC bone.ACC eaten has
'..., because the dog has eaten the bone.'



Multiple verbs

- (30) a. ... because **the dog** **has eaten** **the bone**
b. ... weil **der Hund** **den Knochen** **gefressen hat**.
... because the dog the.ACC bone.ACC eaten has
'..., because the dog has eaten the bone.'



Multiple verbs

(31) Verb second as move closest (structural version):

TOPIC **auxiliary** Subject **Object** main verb **auxiliary**

A red curved arrow originates from the second 'auxiliary' and points to the first 'auxiliary', illustrating the movement of the auxiliary verb to the second position in the sentence structure.

Multiple verbs

- (31) Verb second as move closest (structural version):

TOPIC **auxiliary** Subject Object **main verb** **auxiliary**



- (32) Verb second as move closest (linear version):

TOPIC **main verb** Subject Object ~~main verb~~ **auxiliary**



Multiple verbs

- (33) a. ... weil **der Hund** **den** **Knochen** **gefressen hat**.
... because the dog the.ACC bone.ACC eaten has
'..., because the dog has eaten the bone.'

Multiple verbs

- (33) a. ... weil **der Hund** **den** **Knochen** **gefressen hat**.
... because the dog the.ACC bone.ACC eaten has
'..., because the dog has eaten the bone.'
- b. **der Hund hat** **den** **Knochen** **gefressen**.
the dog has the.ACC bone.ACC eaten
'..., because the dog has eaten the bone.'

Ambiguity: recap

Nodes and hierarchies

Question Formation in English

Multiple strings: one meaning

Verb Second in German

Verb second cares about hierarchy

Conclusions

conclusions

- ▶ Two rules

conclusions

- ▶ Two rules
 - ▶ Question formation in English

conclusions

- ▶ Two rules
 - ▶ Question formation in English
 - ▶ Verb second in German

conclusions

- ▶ Two rules
 - ▶ Question formation in English
 - ▶ Verb second in German
- ▶ The observations
 - ▶ Verb movement in English targets the main-clause auxiliary

conclusions

- ▶ Two rules
 - ▶ Question formation in English
 - ▶ Verb second in German
- ▶ The observations
 - ▶ Verb movement in English targets the main-clause auxiliary
 - ▶ Verb movement in German targets the structurally highest verb

conclusions

- ▶ Two rules
 - ▶ Question formation in English
 - ▶ Verb second in German
- ▶ The observations
 - ▶ Verb movement in English targets the main-clause auxiliary
 - ▶ Verb movement in German targets the structurally highest verb
- ▶ These two rules are dependent on structure, not on linear order