

# Movement in frames

## On German *steigen* ‘rise/climb’

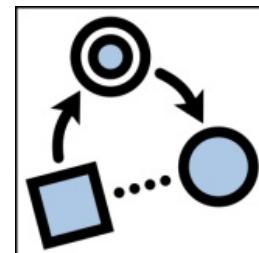
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# Major uses of the German movement verb *steigen* 'climb, rise, step'

The German verb *steigen* can be used as a:

1. verb of manner of motion
2. verb of directed motion
3. figurative verb of change

# Objectives

- investigate the "anatomy" of the different uses and the relationship between these uses

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- investigate the "anatomy" of the different uses and the relationship between these uses
- develop an analysis in terms of frames

# Polysemy of *steigen* 'climb, rise': *steigen* as a verb of manner of motion

## 1. *steigen*<sub>manner</sub>:

*Hans steigt auf einen Berg.*

H. climbs on a mountain

'Hans is climbing a mountain.'



# Polysemy of *steigen* 'climb, rise': *steigen* as a verb of directed motion

## 2. *steigen*<sub>directional</sub>:

***Der Ballon steigt.***

the balloon climbs

'The balloon is climbing.'



# Polysemy of *steigen* 'climb, rise': *steigen* as a figurative verb of change

## 3. *steigen*<sub>figurative</sub>:

***Die Temperatur der Flüssigkeit steigt.***

the temperature of the liquid rises

'The temperature of the liquid is rising.'



# Manner of motion vs. direction of motion

*steigen*<sub>manner</sub> → use of legs/feet,  
ground contact

a. ✓ ***Die Ziegen steigen aufs Dach.***

the goats climb onto.the roof

'The goats are climbing onto the roof.'



# Manner of motion vs. direction of motion

*steigen*<sub>manner</sub> → use of legs/feet,  
ground contact

- b. ??***Die Schnecke steigt auf die Pflanze.***  
the snail        climbs onto the plant  
'The snail is climbing onto the plant.'



# Manner of motion vs. direction of motion

*steigen*<sub>manner</sub> → use of legs/feet,  
ground contact

- c. ?? ***Der Zug steigt auf den Berg.***  
the train climbs onto the mountain  
'The train is climbing the mountain.'



# Manner of motion vs. direction of motion

Geuder & Weisgerber (2008):

*steigen*<sub>manner</sub> can be instantiated by a single step

***Sie stieg über die Pfütze.***

she stepped over the puddle

'She stepped over the puddle.'



# Manner of motion vs. direction of motion

*steigen*<sub>directional</sub> → freely suspended object,  
no reference to extremities

- a. *Der Ballon stieg höher und höher.*  
the balloon climbed higher and higher  
'The balloon climbed higher and higher.'



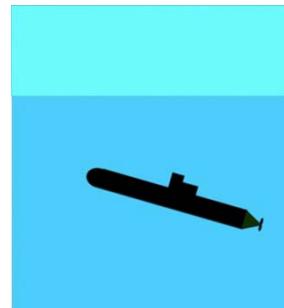
# Manner of motion vs. direction of motion

*steigen*<sub>directional</sub> → freely suspended object,  
no reference to extremities

- a. ***Der Ballon stieg höher und höher.***  
the balloon climbed higher and higher  
'The balloon climbed higher and higher.'



- b. ***Das U-Boot stieg an die Oberfläche.***  
the submarine climbed to the surface  
'The submarine climbed towards the surface.'



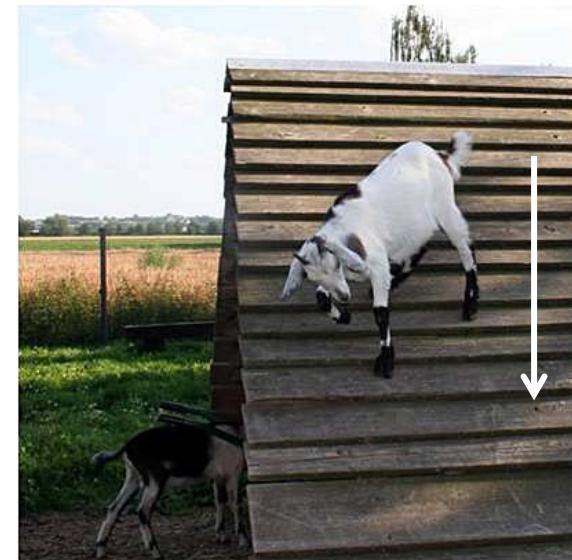
# Manner of motion vs. direction of motion

*steigen*<sub>manner</sub>: combination with all kinds of directionals

a. *Die Ziegen stiegen vom Dach.*

the goats climbed from.the roof

'The goats climbed (down) from the roof.'



# Manner of motion vs. direction of motion

*steigen*<sub>directional</sub>: only upward direction

- b. \**Der Ballon stieg tiefer und tiefer.*  
the balloon climbed deeper and deeper  
lit.: \*'The balloon climbed deeper and deeper.'



# Manner of motion vs. direction of motion

*steigen*<sub>manner</sub>: directional complement necessary

- a. \*Hans *stieg* den ganzen Tag.  
H. climbed the whole day  
lit.: 'Hans climbed the whole day long.'

*steigen*<sub>directional</sub>: directional complement optional

- b. ✓*Der Ballon stieg.*  
the balloon climbed  
'The balloon was climbing.'

# Manner of motion vs. direction of motion

*steigen*<sub>manner</sub>

- use of legs/feet
- ground contact
- all directions
- dir-comp. obligatory

*steigen*<sub>directional</sub>

- no reference to limbs
- freely suspended
- only upwards
- dir-comp. optional

# Manner of motion vs. direction of motion

⇒ Geuder & Weisgerber (2008):

The manner component of German *steigen* is more specific than that of the English verb *climb* (cf. the discussion of *climb* by Fillmore (1982), Jackendoff (1985) and Levin & Rappaport (2013) among others)

# Manner of motion vs. direction of motion

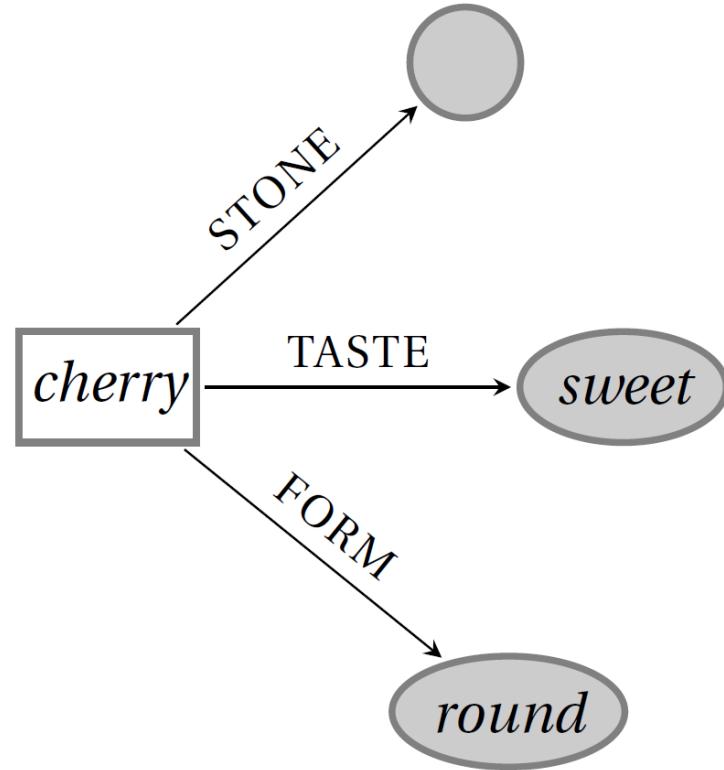
- ⇒ Gamerschlag, Geuder & Petersen (2014):  
There are 2 clearly distinguished variants of  
*steigen* referring to movement in space
- The restriction of directional *steigen* to upward movement can perhaps be motivated from a stereotype of upward movement associated with the manner use of *steigen* (cf. Levin & Rappaport).

# Analysis: Framework

- Conceptual knowledge is captured in frame representations.
- Frame representations provide an explicit, variable-free, and cognitively plausible format.
- Frames are defined as recursive attribute-value structures (Barsalou 1992).
- The attributes correspond to mathematical functions.

# Frames for nominal concepts

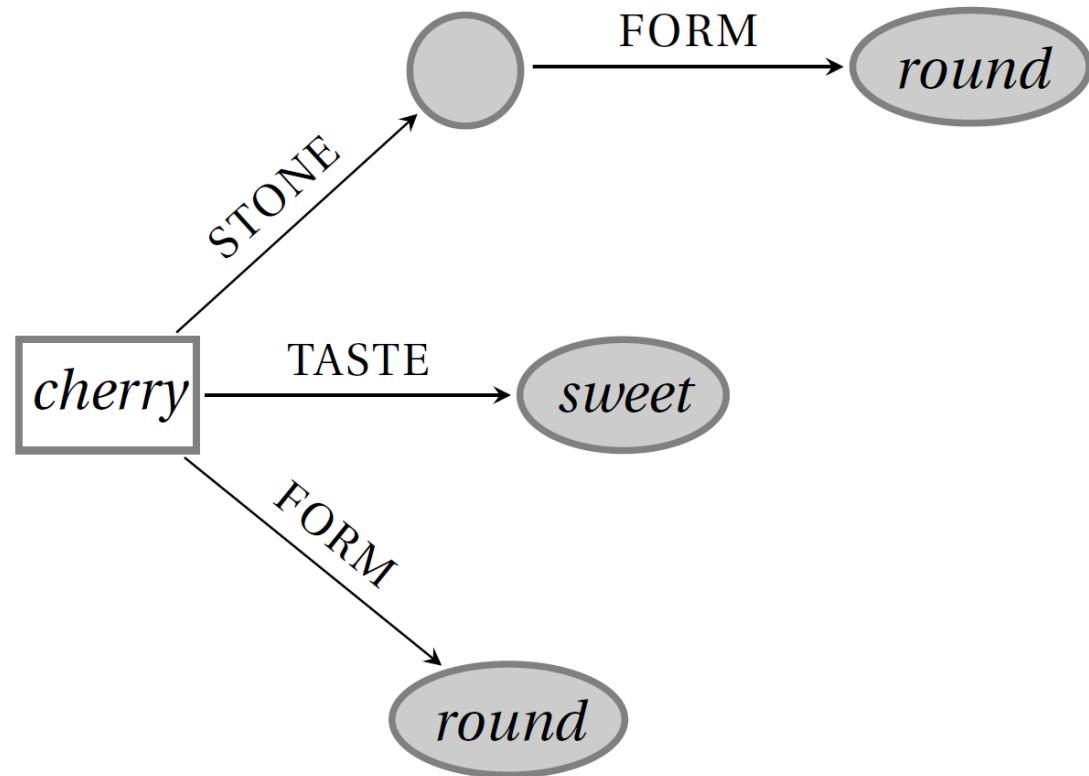
(Petersen 2007, Petersen & Osswald 2014)



frame representation of sortal concept 'cherry'

# Frames for nominal concepts

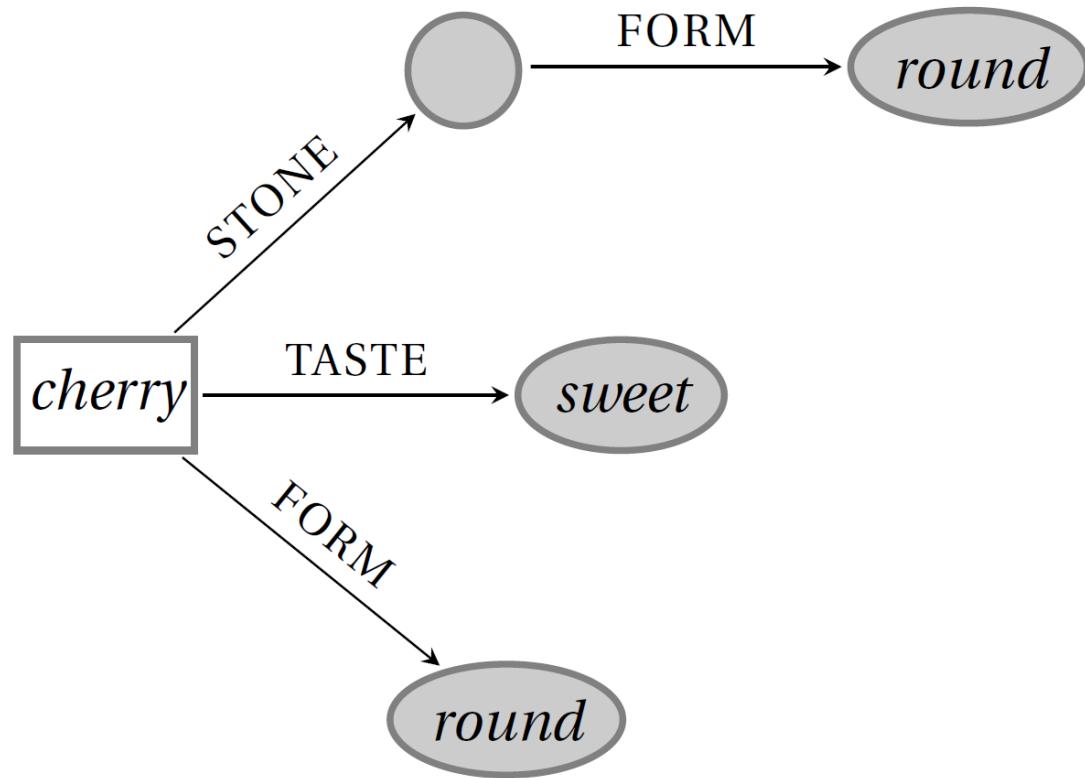
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frame representation of sortal concept 'cherry'

# Frames for nominal concepts

(Petersen 2007, Petersen & Osswald 2014)

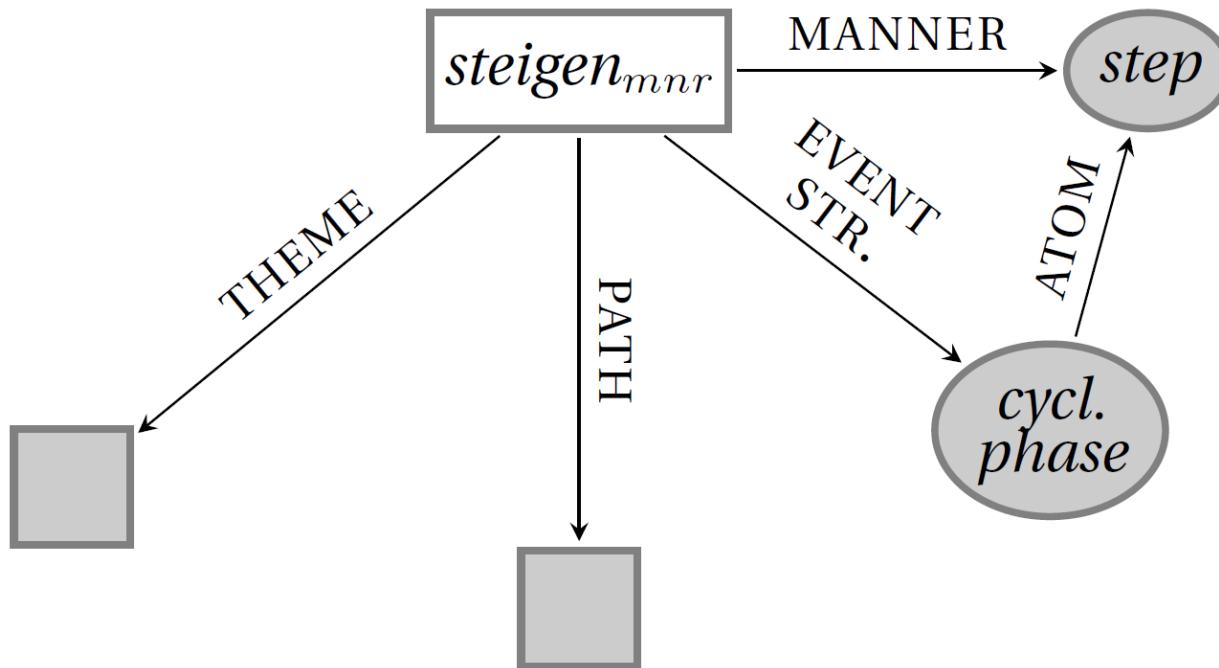


frame representation of sortal concept 'cherry'

'cherry':  $\lambda x. \text{cherry}(x) \wedge \text{round}(\text{FORM}(\text{STONE}(x))) \wedge \text{sweet}(\text{TASTE}(x)) \wedge \text{round}(\text{FORM}(x))$

# Frame analysis of *steigen*<sub>manner</sub>

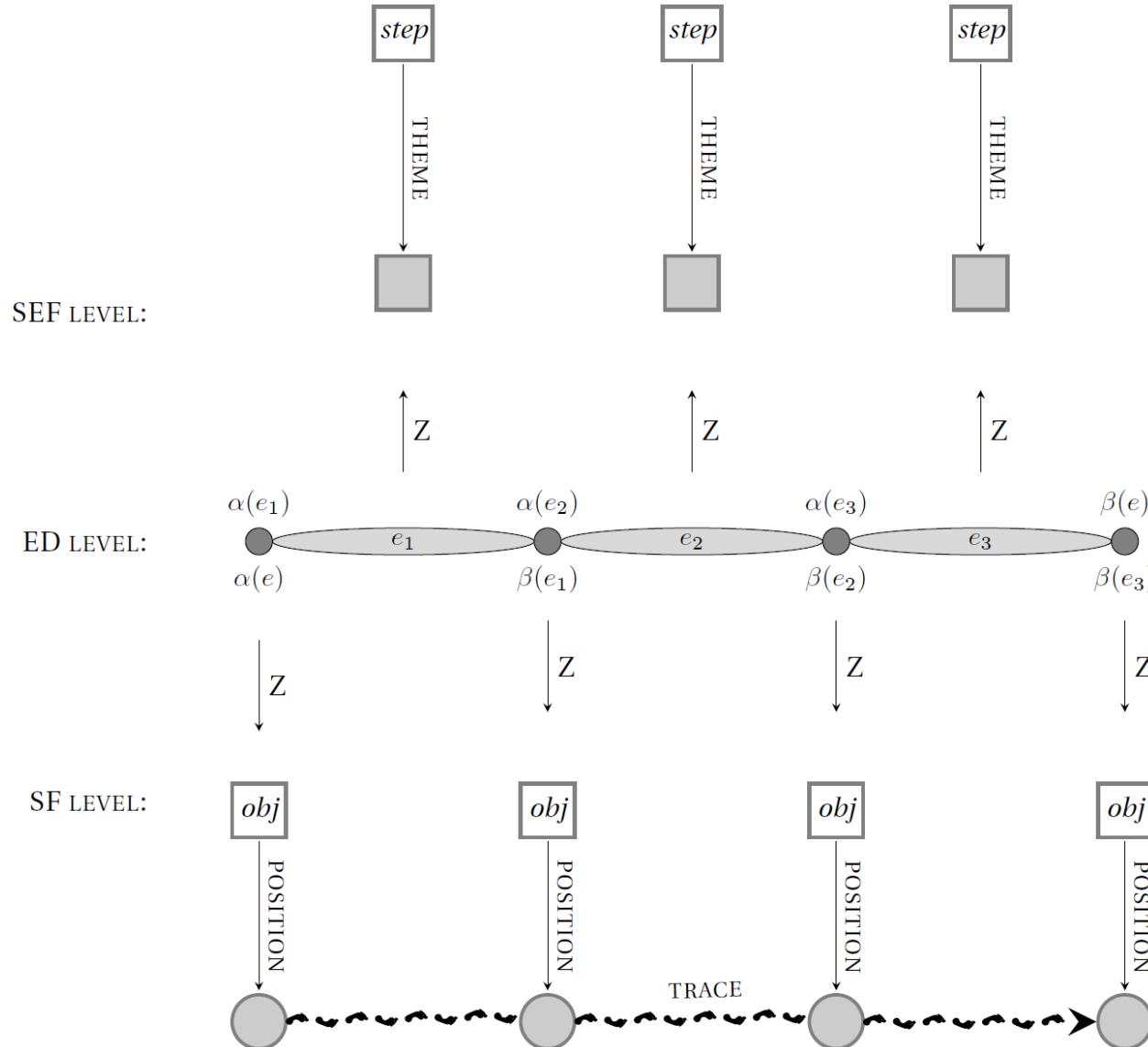
Naumann (2013): *static event frames* (SEFs) represent global properties of the overall event/static dimensions



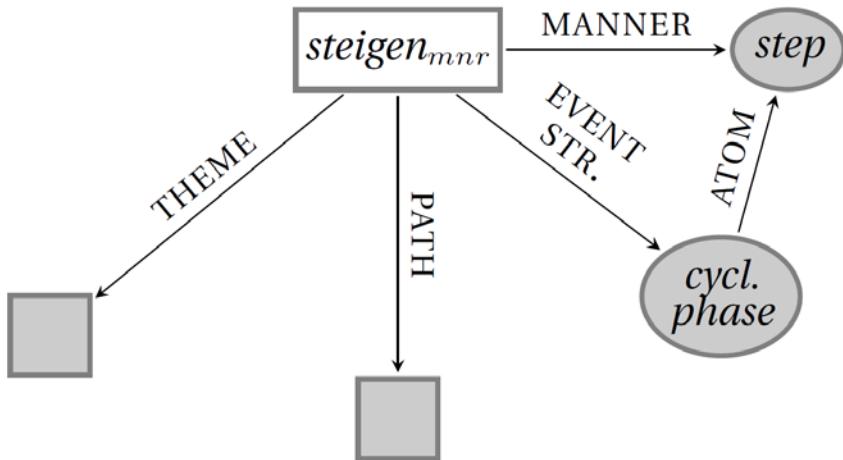
static event frame of *steigen*<sub>manner</sub>  
(Gamerschlag, Geuder & Petersen 2014)

# Event structure of *steigen*<sub>manner</sub>

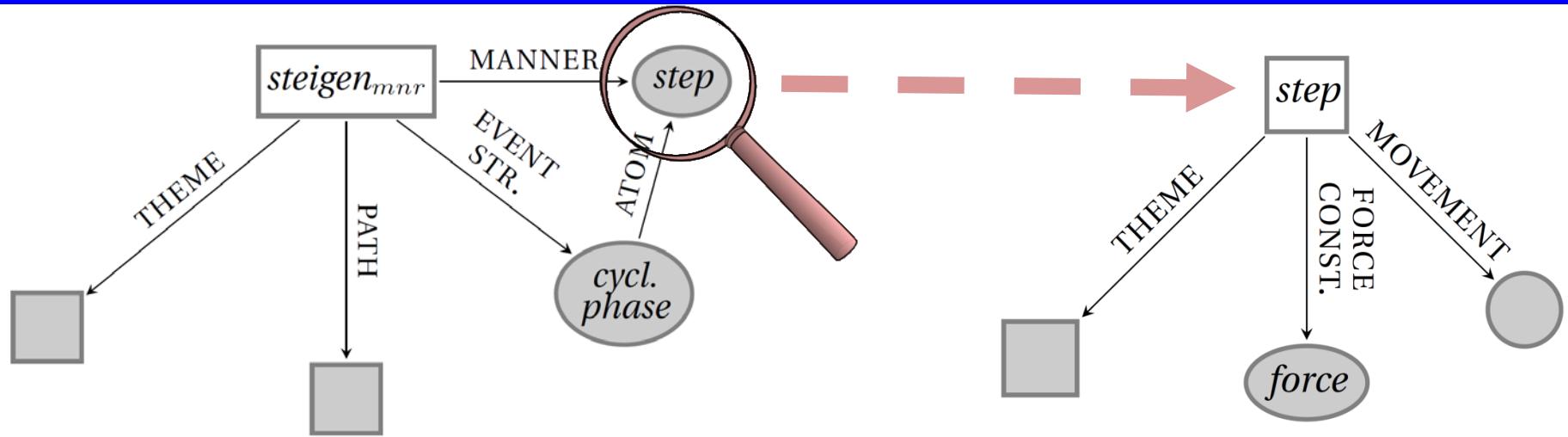
(Gamerschlag, Geuder & Petersen 2014)



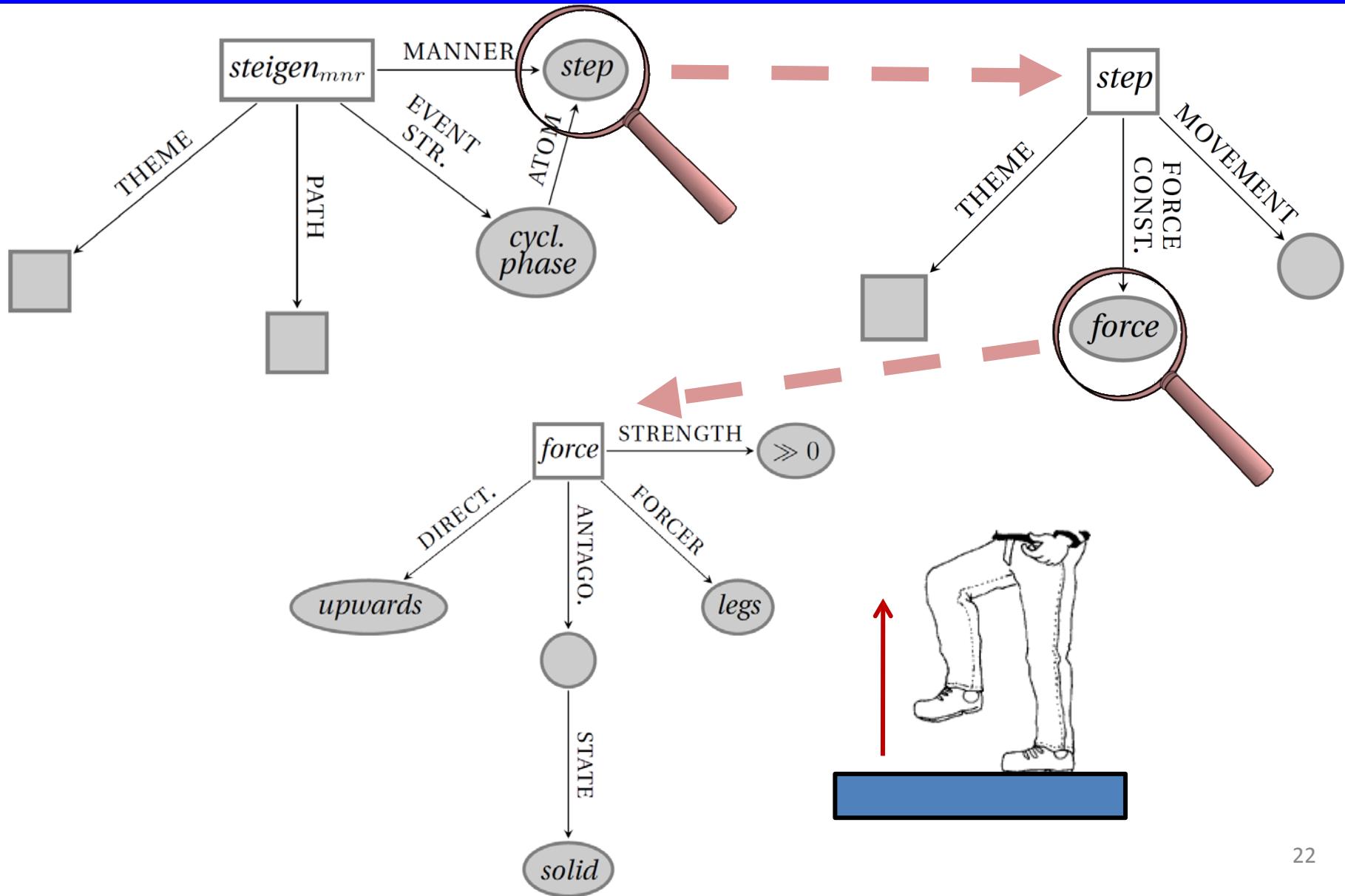
# Zooming into the manner component of *steigen*<sub>manner</sub>



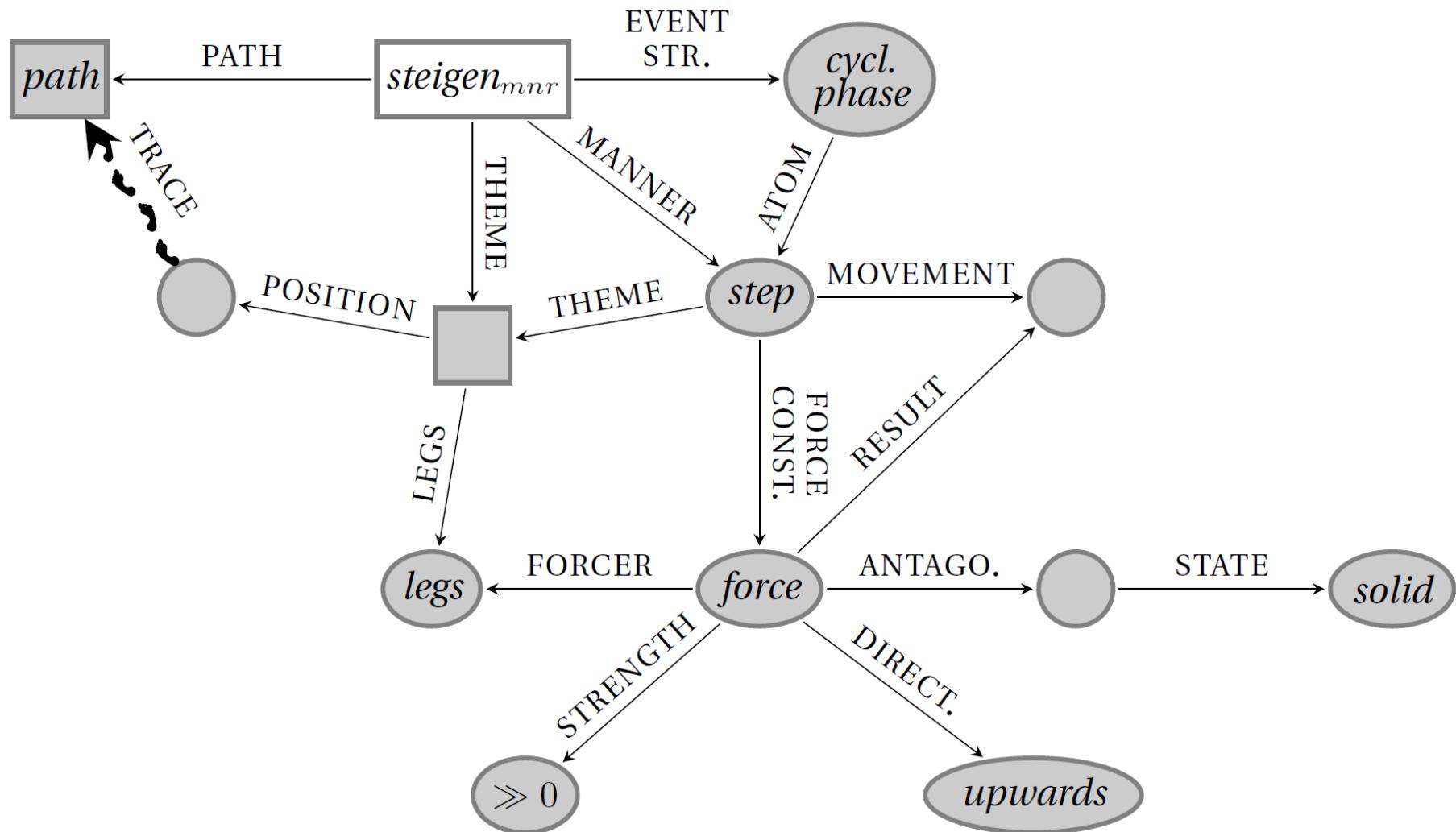
# Zooming into the manner component of *steigen*<sub>manner</sub>



# Zooming into the manner component of *steigen*<sub>manner</sub>



# Detailed frame of *steigen*<sub>manner</sub>



# Extending the analysis to *steigen*<sub>directional</sub>

*steigen*<sub>directional</sub>:

***Der Ballon steigt.***

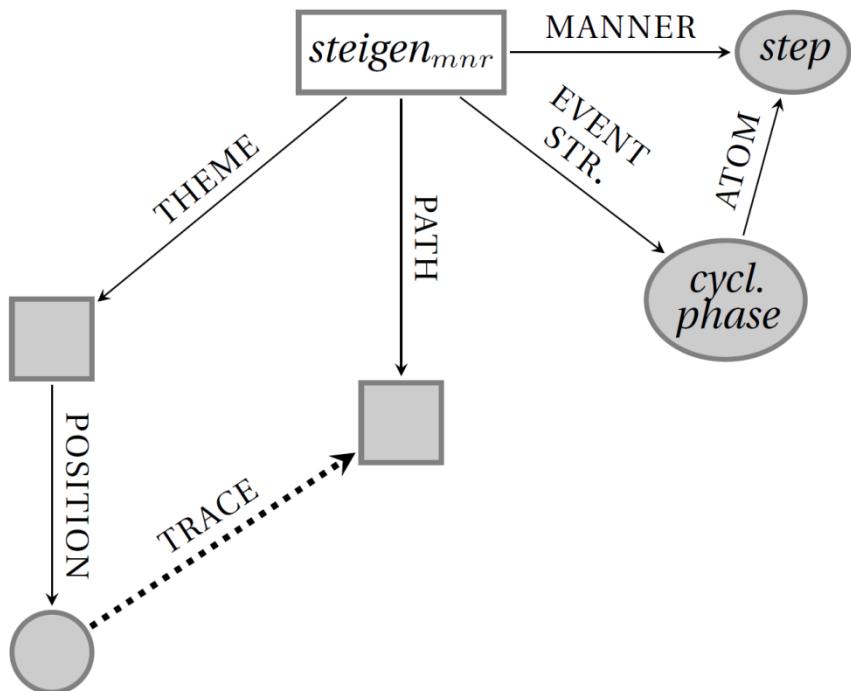
the balloon climbs

'The balloon is climbing.'

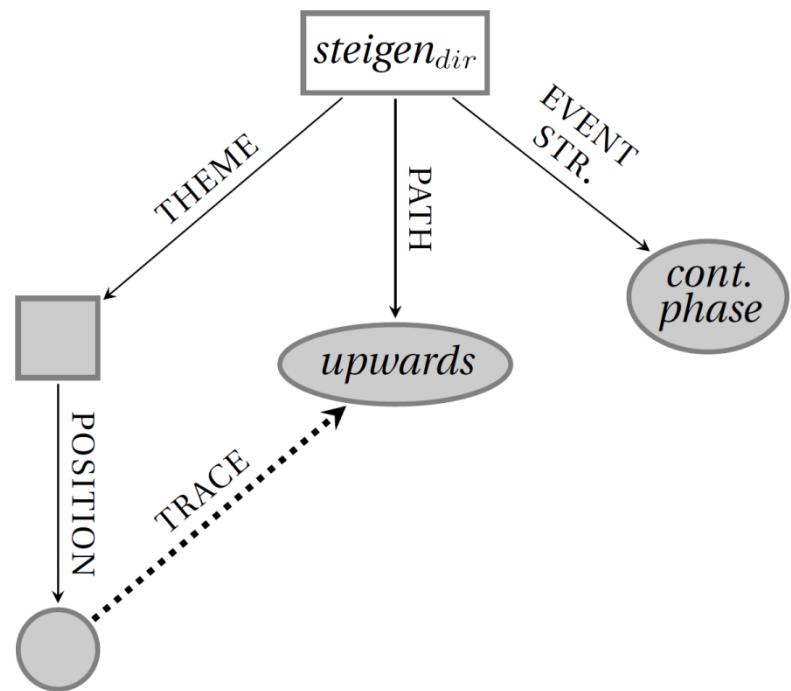


- no reference to limbs
- freely suspended
- only upwards
- dir-comp optional

# Frames of *steigen*<sub>manner</sub> vs. *steigen*<sub>directional</sub>

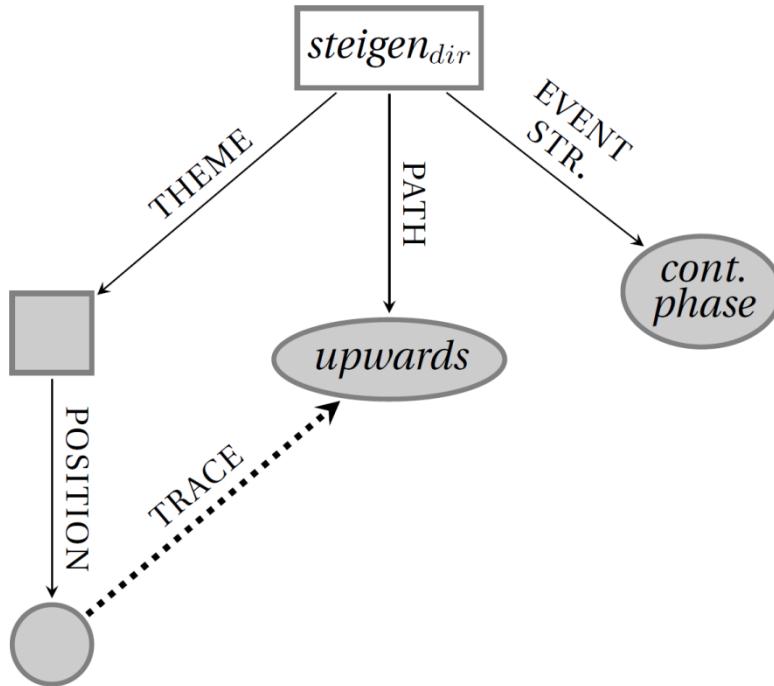


*steigen*<sub>manner</sub>

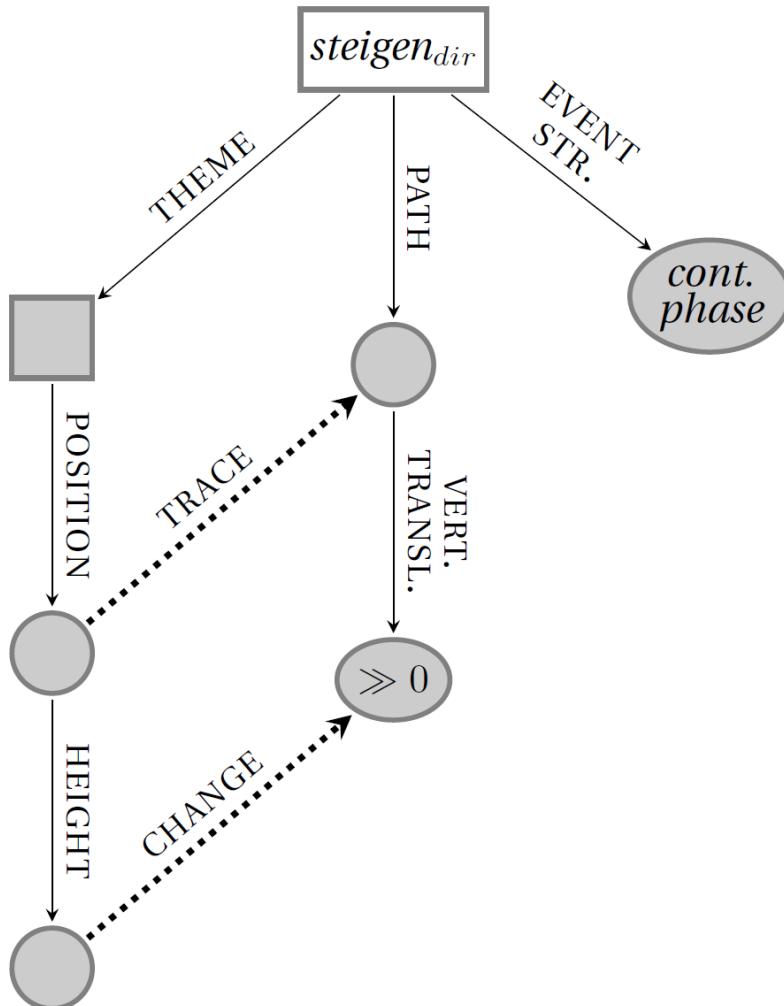


*steigen*<sub>directional</sub>

# Zooming into the "upwards" node of *steigen<sub>dir</sub>*



# Zooming into the "upwards" node of *steigen<sub>dir</sub>*



# Extending the analysis to *steigen*<sub>figurative</sub>

*steigen*<sub>figurative</sub>:

***Die Temperatur der Flüssigkeit steigt.***

the temperature of the liquid rises

'The temperature of the liquid is rising.'



# Extending the analysis to *steigen*<sub>figurative</sub>

*steigen*<sub>figurative</sub> can only express an increase along the respective scale but never a decrease:

- a. ***Die Temperatur steigt von 3 auf 10 Grad.***  
the temperatur rises from to degrees  
'The temperature is rising from 3 to 10 degrees.'
  
- b. \****Die Temperatur steigt von 10 auf 3 Grad.***  
the temperatur rises from to degrees  
lit.: 'The temperature is rising from 10 to 3 degrees.'

# *steigen*<sub>directional</sub> vs. *steigen*<sub>figurative</sub>

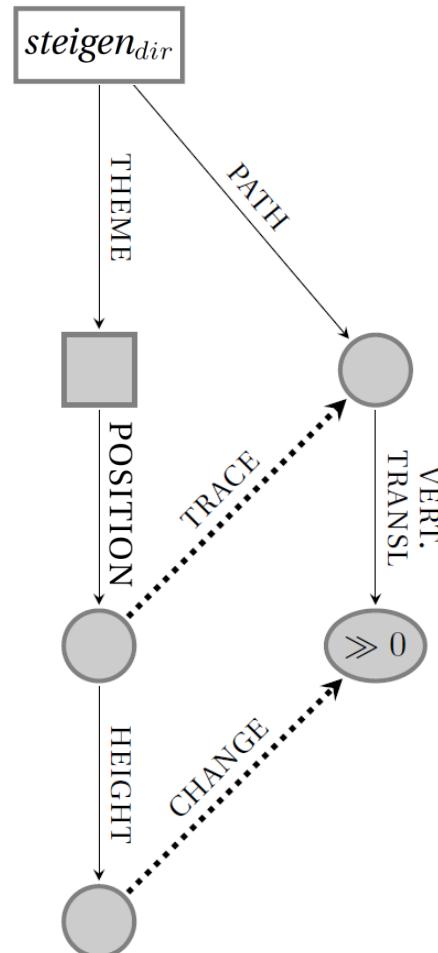
## *steigen*<sub>directional</sub>

- motion along a path scale
- no manner component
- only upwards
- dir-comp optional

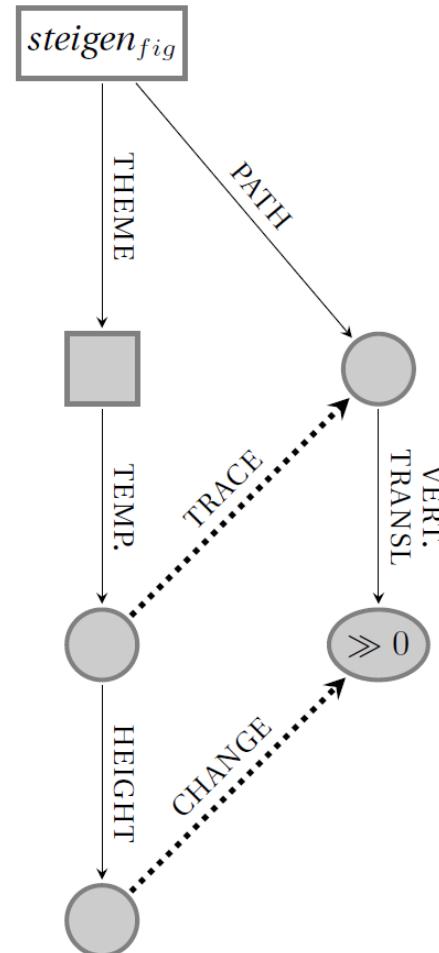
## *steigen*<sub>figurative</sub>

- "motion" along a quality scale
- no manner component
- only upwards/increase
- dir-comp optional

# Frames of *steigen*<sub>directional</sub> vs. *steigen*<sub>figurative</sub>



*steigen*<sub>directional</sub>



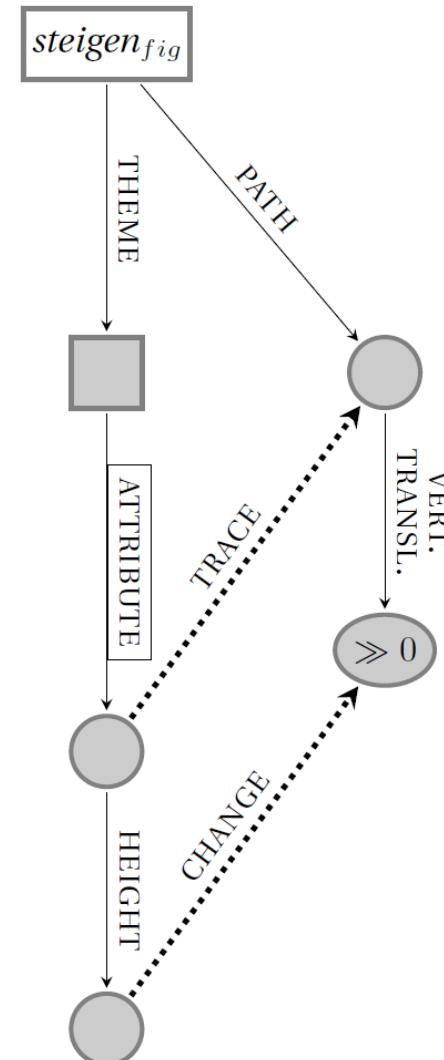
*steigen*<sub>figurative</sub>:  
*die Temperatur steigt*  
'the temperature is rising'

# *steigen*<sub>figurative</sub>: generalized frame and external attribute realization by the subject

*die Temperatur der Flüssigkeit steigt*  
'the temperature of the liquid is rising'



'the temperature of the liquid'



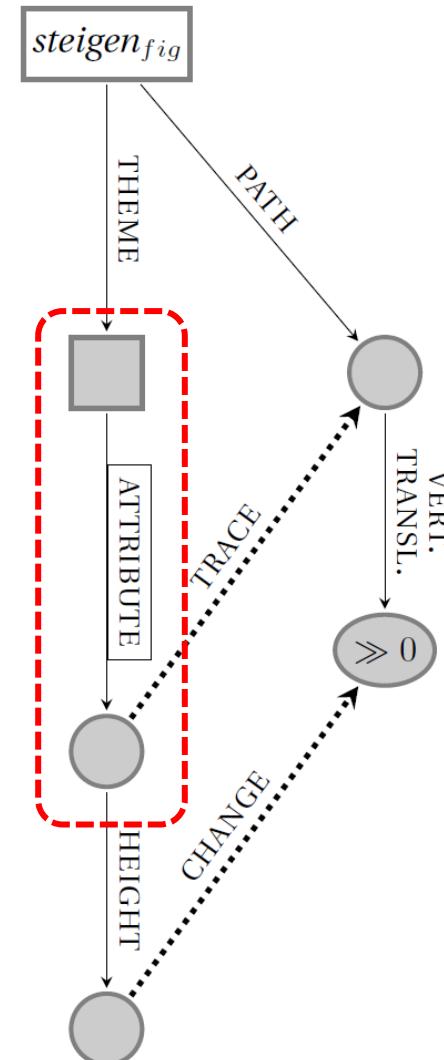
*steigen*<sub>figurative</sub>

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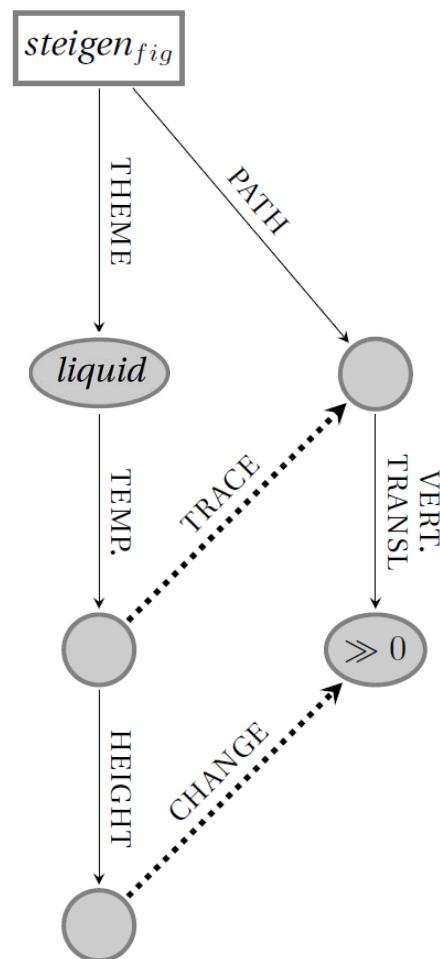


'the temperature of the liquid'



*steigen*<sub>figurative</sub>

# *steigen*<sub>figurative</sub>: generalized frame and external attribute realization by the subject



*die Temperatur der Flüssigkeit steigt*  
'the temperature of the liquid is rising'

# Conclusion

- An adequate analysis of the major uses of *steigen* requires explicit reference to the "anatomical" details of these uses such as subevents, manner, positions and the overall path traversed by the theme argument
- Frame representations show a flexible degree of complexity (zooming in and out by expanding/not expanding nodes) which allows for easy access to the relevant details of each use

# Conclusion

- The relationships that hold between the different uses can be analyzed by comparing the structures of the corresponding frames
- The figurative use of *steigen* can be derived from the directional use by a minimal modification of the frame for directional *steigen* which allows for the integration of an attribute contributed externally by the subject