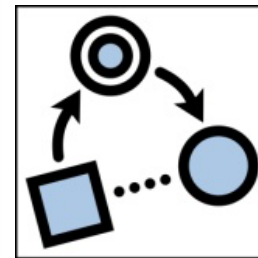


Sitting, standing, and lying in frames: a frame-based approach of stative verbs of location

Thomas Gamerschlag, Wiebke Petersen & Liane Ströbel

Institute of Language and Information

Heinrich-Heine-Universität Düsseldorf



SFB 991

Stative verbs of location (SVLs)

- Stative verbs of location (e.g. *stand, sit, hang*) encode gestalt properties and spatial information, which are perceived by gestalt recognition and spatial orientation.
- Stative verbs of location (= SVLs) are an excellent object of the investigation of cognition and language (like spatial prepositions and dimensional adjectives).

General location scenario

The garden gnome **is/is located** on the mushroom.

figure location locational relation ground



Location + Posture

The garden gnome is sitting on the mushroom.

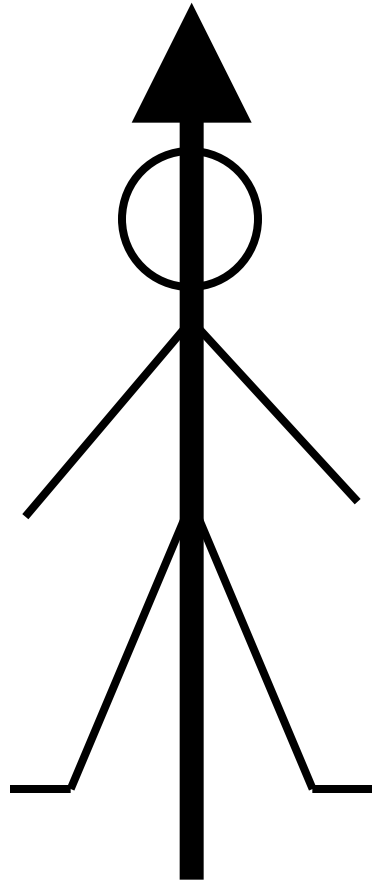
figure location+posture locational relation ground



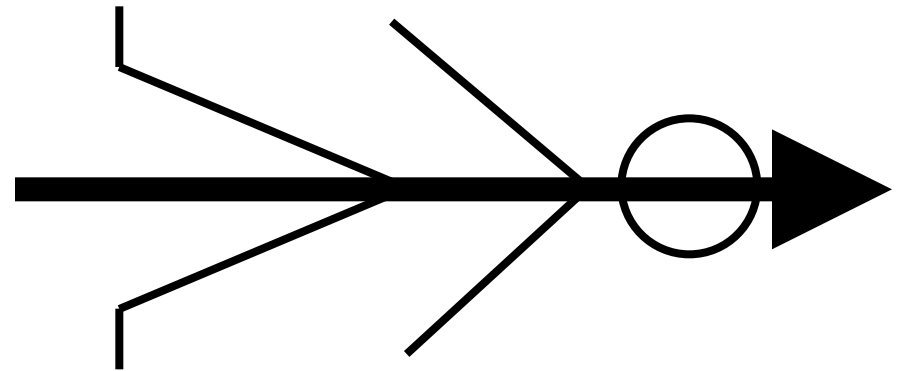
SVLs in German

- German has a comparatively large set of SVLs of different types:
sich befinden 'be located', *stehen* 'stand', *liegen* 'lie',
sitzen 'sit', *knien* 'kneel', *hängen* 'hang', *kleben an* 'stick (to)',
schwimmen (auf) 'be afloat (in liquid)', ...
- The meaning and use of SVLs in German is well described:
(Berthele 2004, Gerling & Orthen 1979, Kaufmann 1994, 95;
Kutscher & Schultze-Berndt 2007, Lang & Carstensen 1990,
Maienborn 1990, 91; Serra Borneto 1996, Schönefeld 2006,
Wunderlich & Kaufmann 1990 among others)

Orientation matters



stehen 'stand'



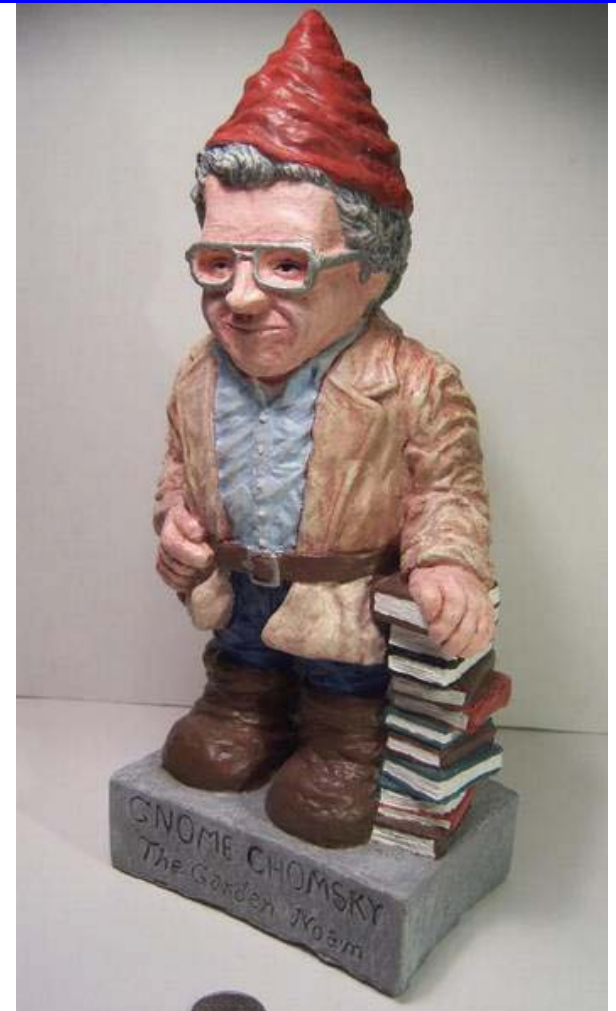
liegen 'lie'

Orientation matters



Der Gartenzwerg liegt auf der Wiese.

'The garden gnome is lying on the lawn.'

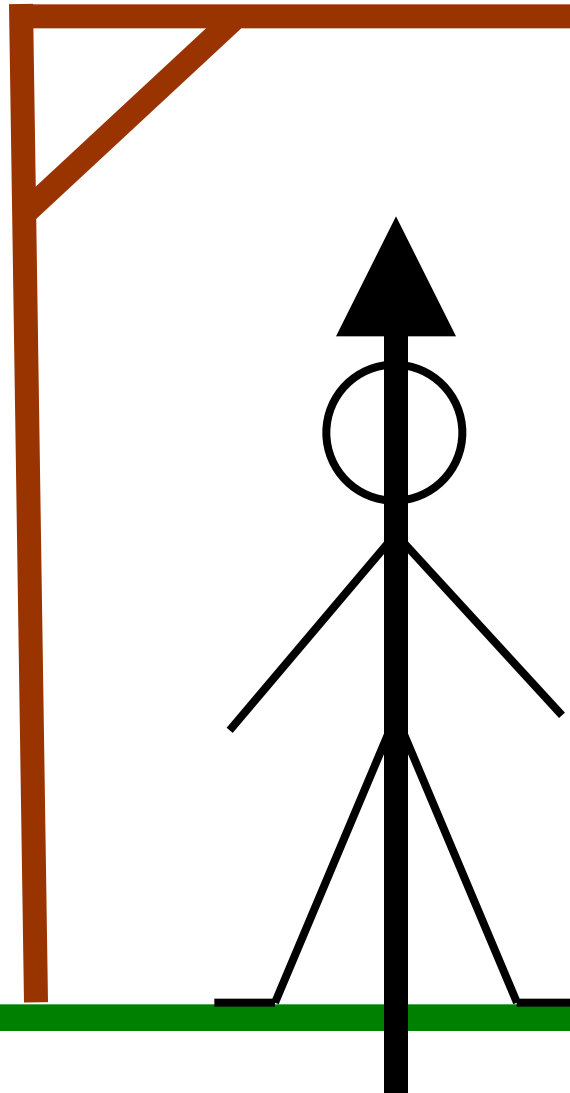


Der Gartenzwerg steht auf dem Sockel.

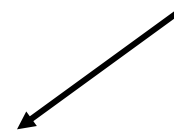
'The garden gnome is standing on the plinth.'

Support matters, too!

stehen 'stand'

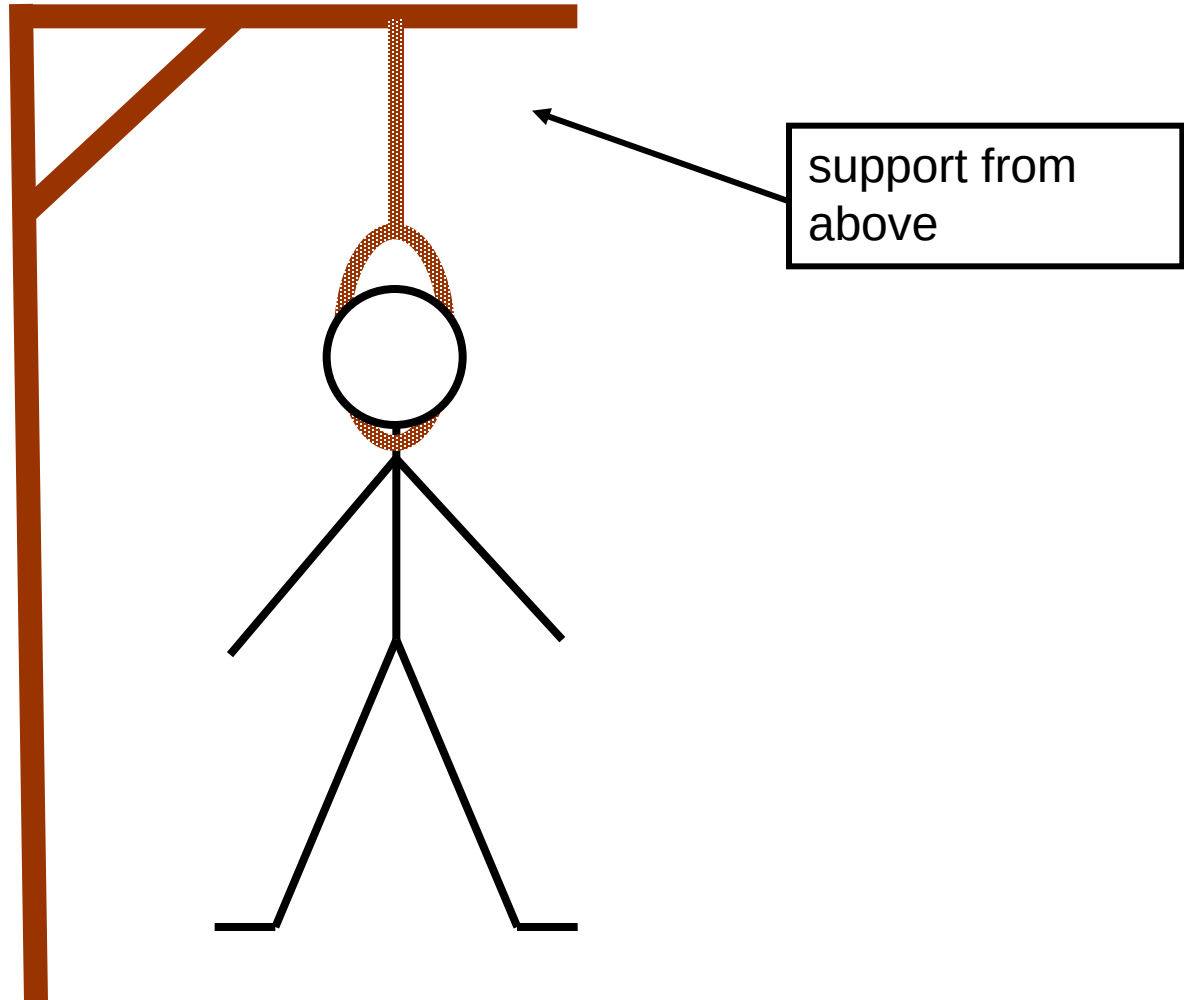


support from
below



Support matters, too!

hängen 'hang'



Support matters, too!

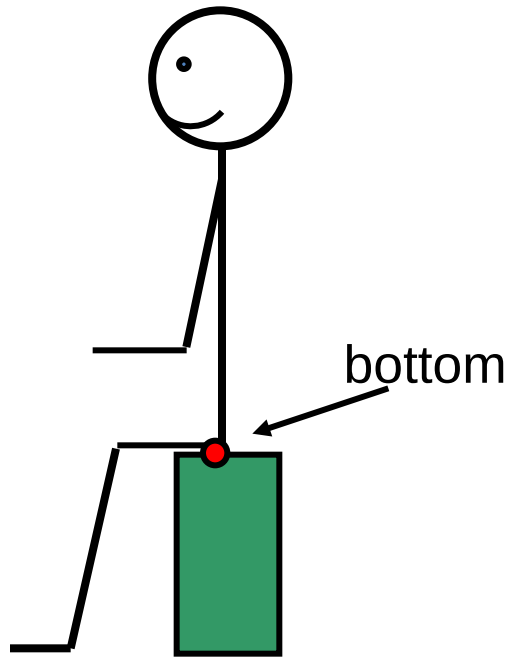


Der Gartenzwerg hängt am Seil/am Galgen.

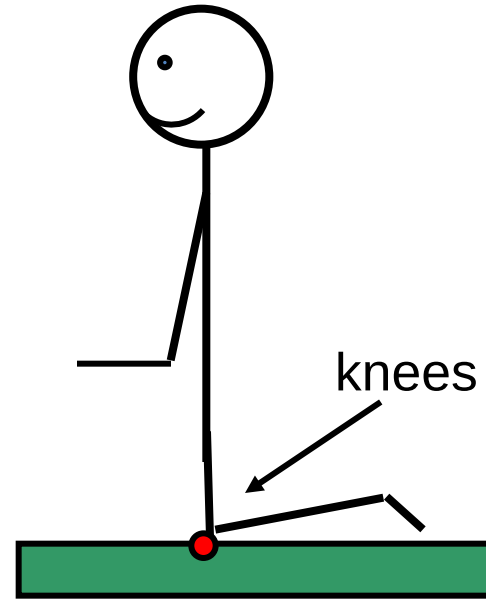
'The garden gnome is hanging at the rope/the gallows.'



The supported part (of the body) also matters



sitzen 'sit'



knien 'kneel'

The supported part (of the body) also matters



Der Gartenzwerg sitzt auf der Schaukel.
'The garden gnome is sitting on the swing.'



Der Gartenzwerg kniet auf der Wiese.
'The garden gnome is kneeling on the lawn.'

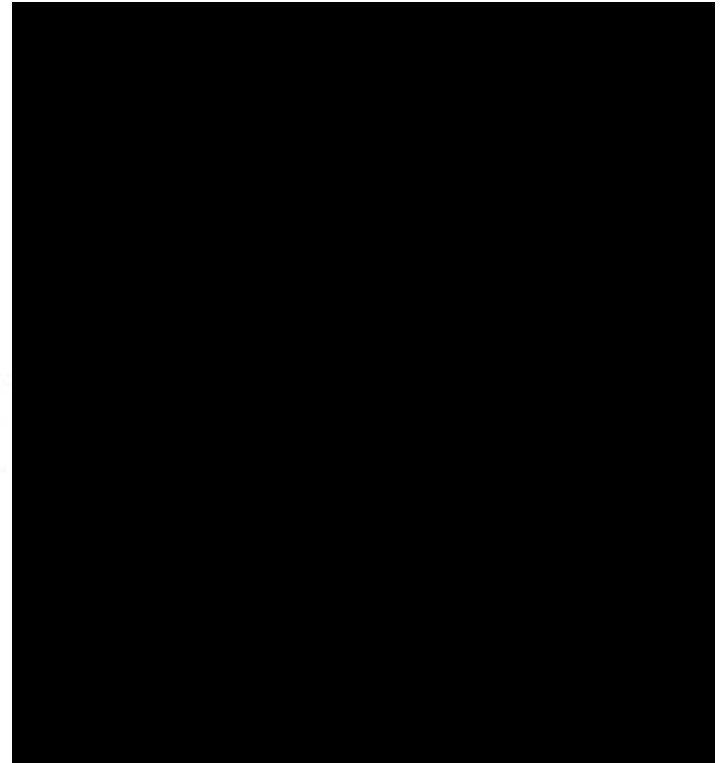
'Standing' and 'lying' do not necessarily
involve specific parts of the body



...or other objects



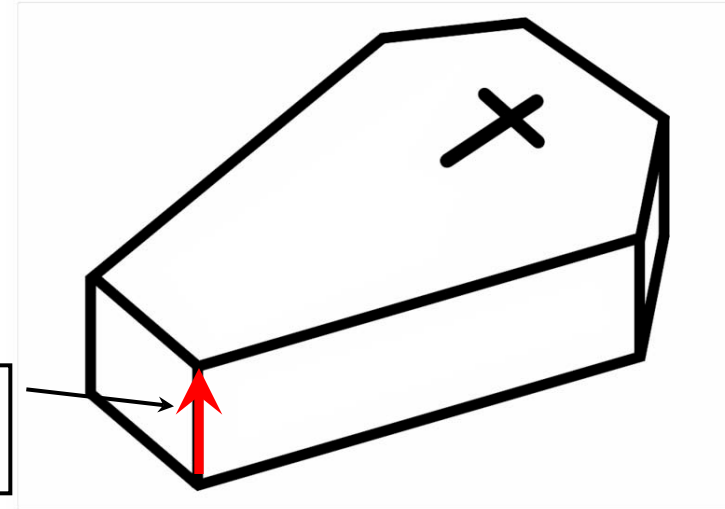
nor does 'hanging'



'Standing' and 'lying' are dependent on inherent gestalt properties



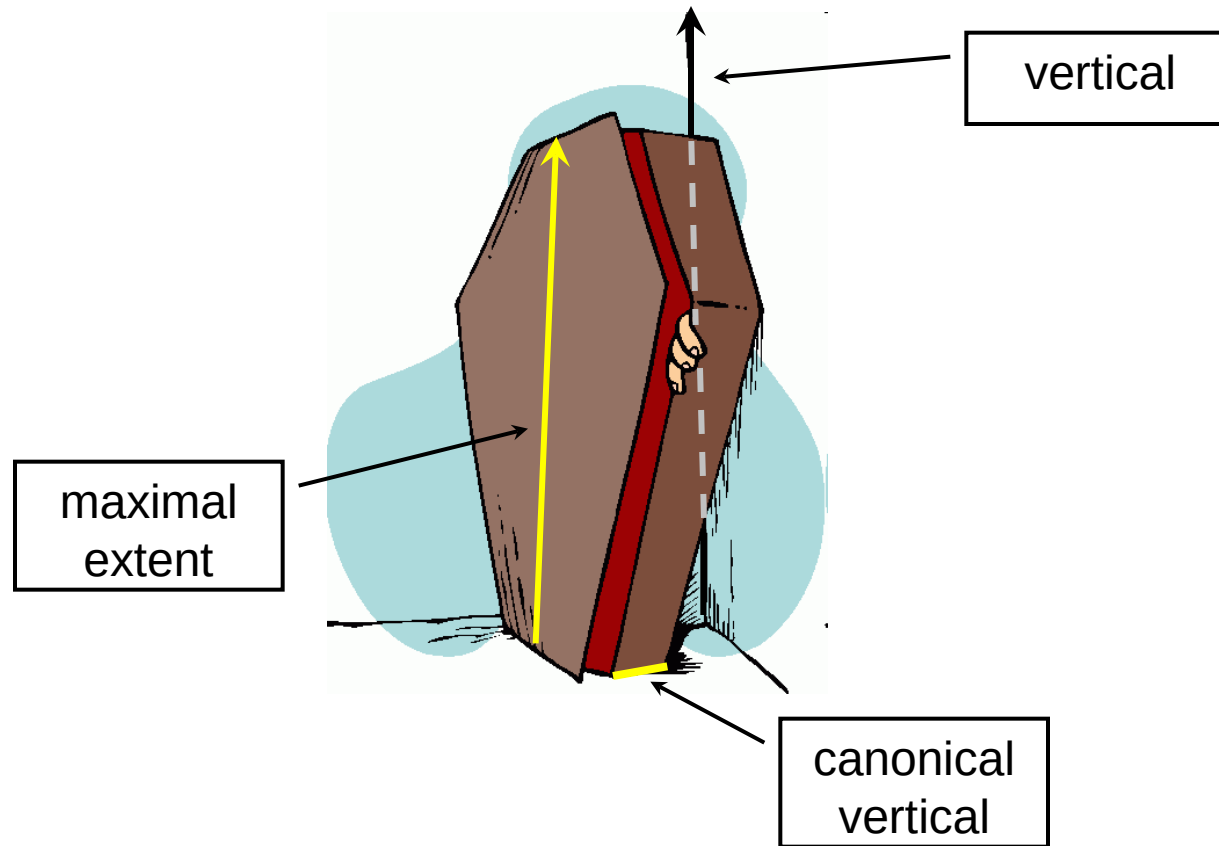
canonical
vertical



#stehender / liegender Ziegelstein
#standing / lying brick

stehender / (?) liegender Sarg
standing / (?) lying coffin

'Standing' and 'lying' are dependent on inherent object properties



stehender / # liegender Sarg
standing / # lying coffin

Spatial knowledge of objects can be captured in object schemata (Lang 1987, 2001)

Object schema for *brick* (Lang 2001):

1D	2D	3D
Max	Across	Min

Object schema for *coffin* (Lang 2001):

1D	2D	3D
Max	Across	Min
		(canonic.) Vert

—————→
saliency/prominency of axis

Representation of SVLs in two-level semantics (Kaufmann 1995)

a. *knien 'kneel'*: $\lambda P \lambda x [KNEEL(x) \ \& \ P(x)]$

b. $\text{Int}(KNEEL(x)) = \exists y [\text{support}_f(\text{d-us}(y), \text{knee}(x))]$

a. *stehen 'stand'*: $\lambda P \lambda x [STAND(x) \ \& \ P(x)]$

b. $\text{Int}(STAND(x)) = \exists y [\text{support}_f(\text{d-us}(y), \text{s(prom}(x)))]$

a. *liegen 'lie'*: $\lambda P \lambda x [LIE(x) \ \& \ P(x)]$

b. $\text{Int}(LIE(x)) = \exists y [\text{support}_f(\text{d-us}(y), \text{s(nprom}(x)))]$

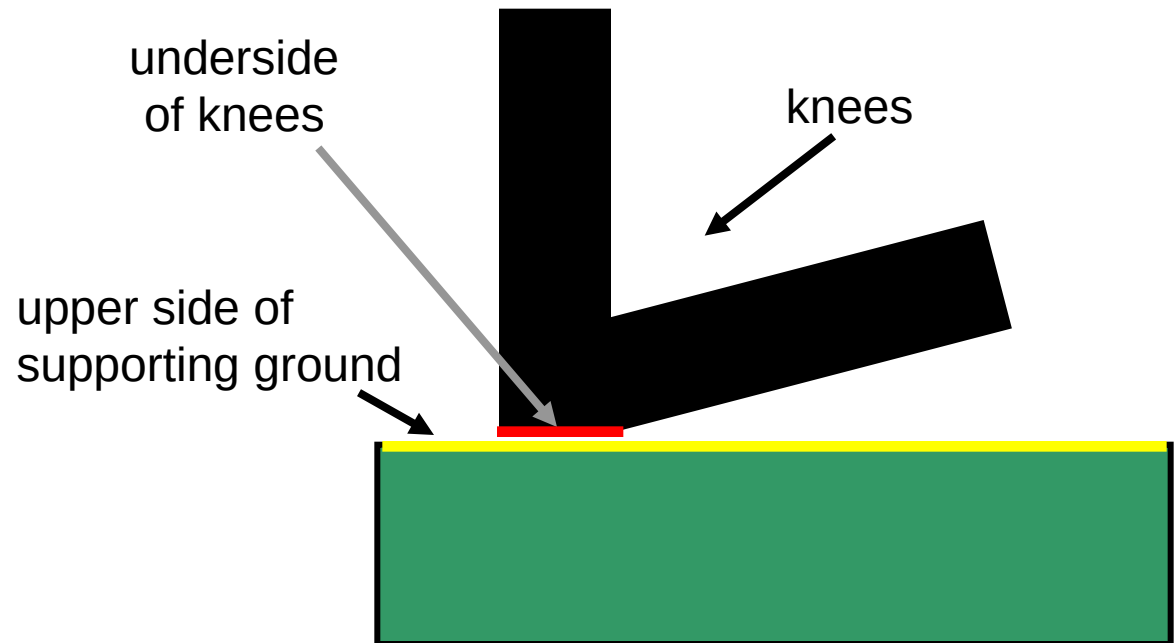
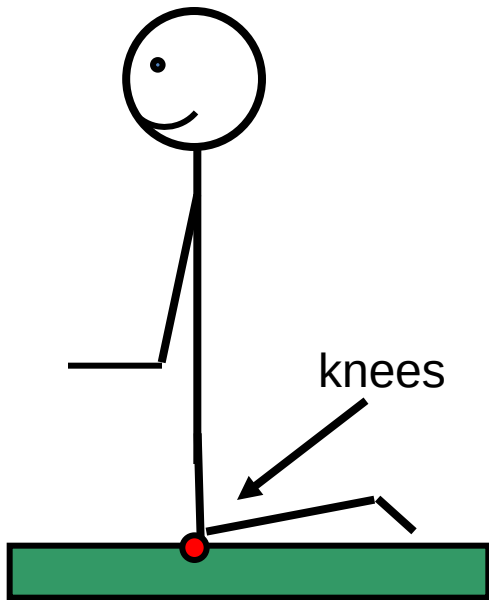
a. *hängen 'hang'*: $\lambda P \lambda x [HANG(x) \ \& \ P(x)]$

b. $\text{Int}(HANG(X)) = \exists y [\text{support}_f(\text{d-nus}(y), \text{side}(x))]$

Representation of *knien* 'kneel' in two-level semantics (Kaufmann 1995)

knien 'kneel':

$\text{Int}(\text{KNEEL}(x)) = \exists y [\text{support}_f(\text{d-us}(y), \text{knee}(x))]$



Analysis: Framework

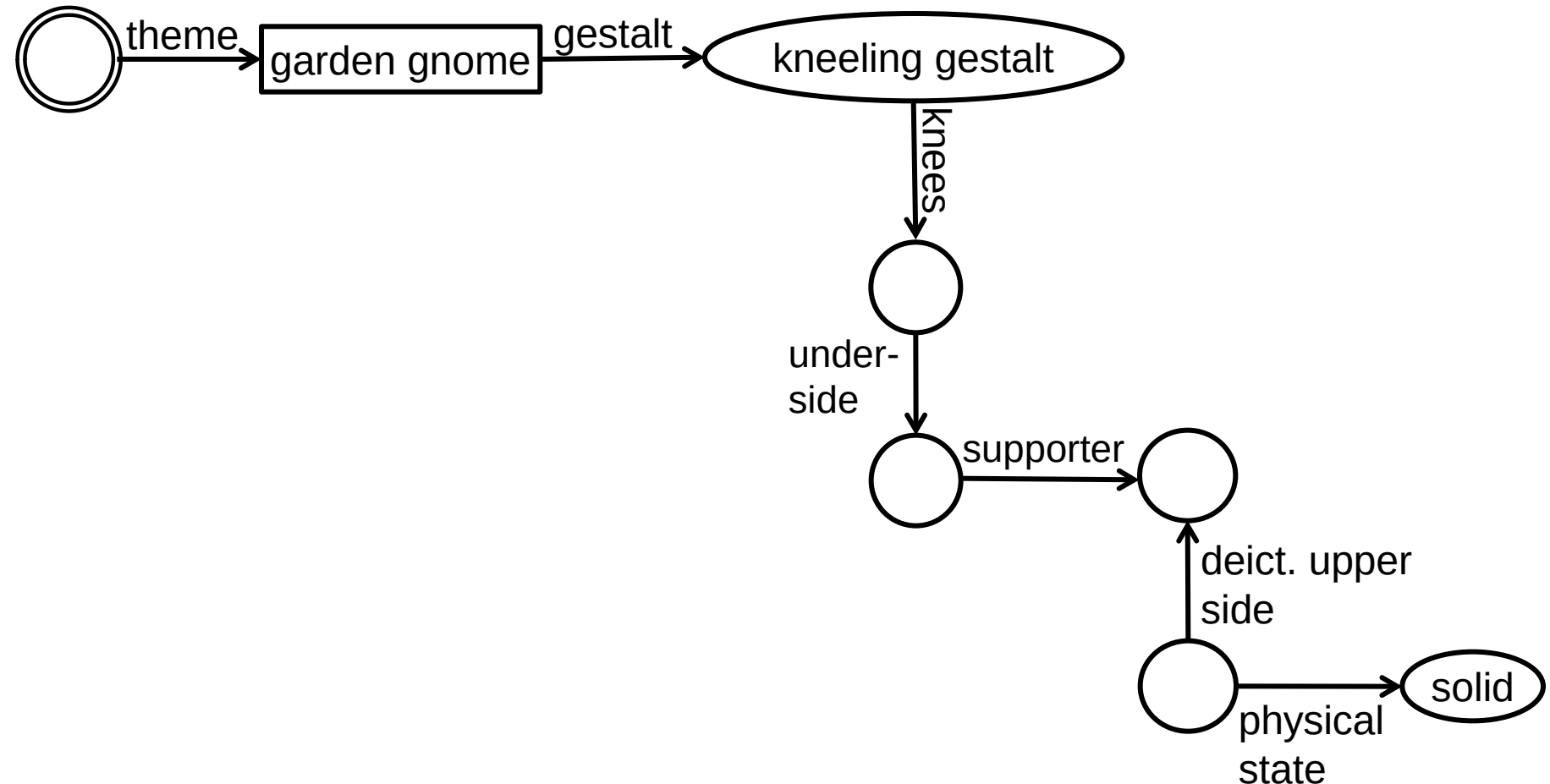
- Conceptual knowledge is captured in frame representations.
- Frame representations provide an explicit, variable-free, and cognitively plausible format
- Frames are defined as recursive attribute-value structures (Barsalou 1992).
- The attributes correspond to mathematical functions.

Der Gartenzwerg kniet. 'The garden gnome is kneeling.'

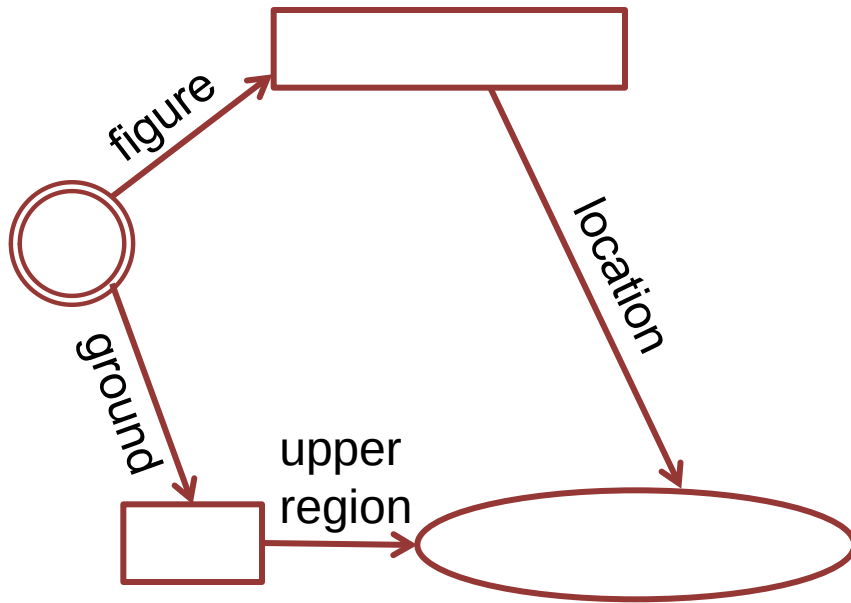


a. *knien* 'kneel': $\lambda P \lambda x [KNEEL(x) \ \& \ P(x)]$

b. $\text{Int}(KNEEL(x)) = \exists y [\text{support}_f(\text{d-us}(y), \text{knee}(x))]$



sein / sich befinden 'be / be located'



Der Gartenzwerg kniet auf der Wiese.

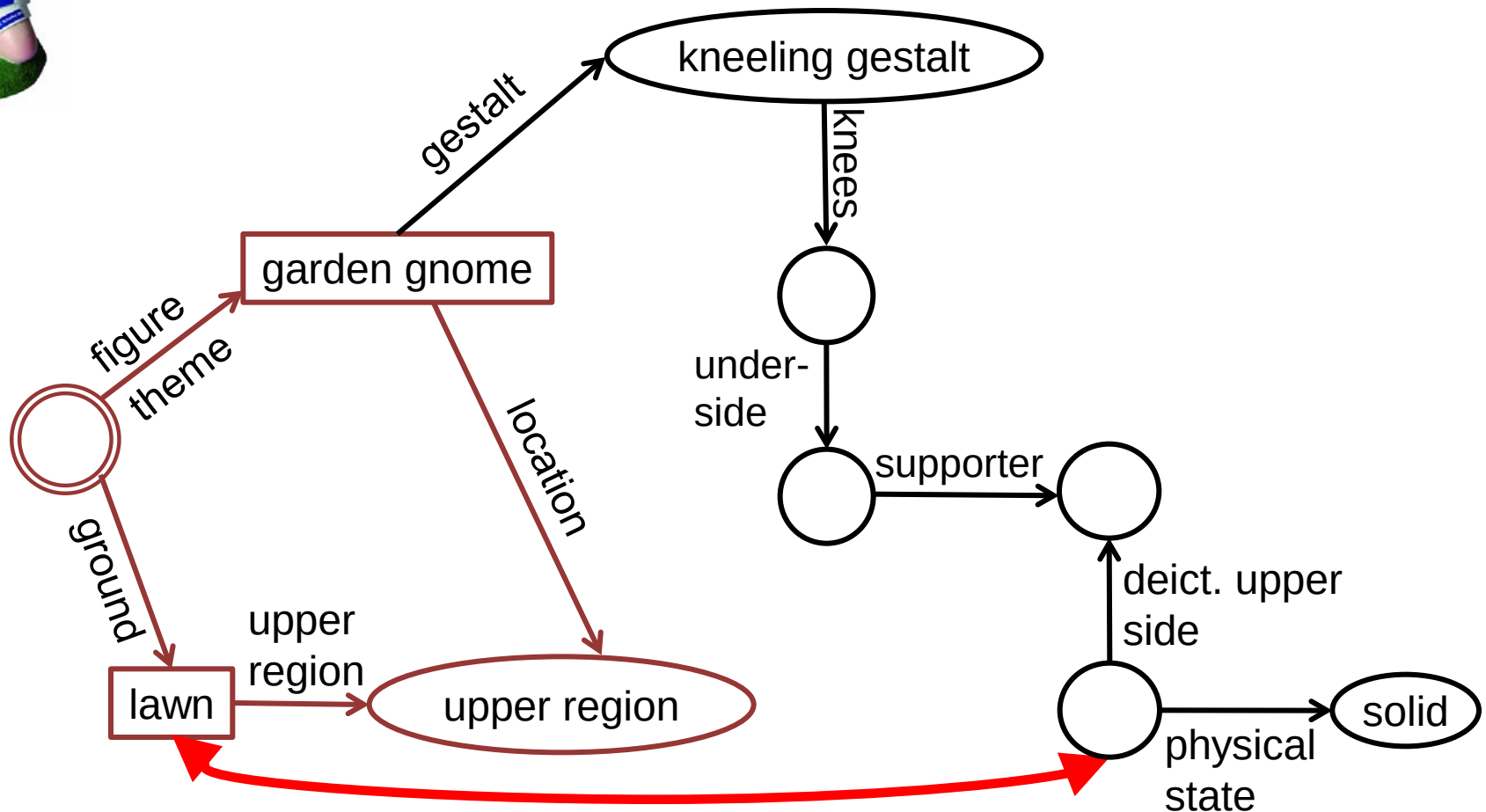
'The garden gnome is kneeling on the lawn.'



a. *knien* 'kneel': $\lambda P \lambda x [KNEEL(x) \ \& \ P(x)]$

b. $\text{Int}(KNEEL(x)) = \exists y [\text{support}_f(\text{d-us}(y), \text{knee}(x))]$

c. *auf* 'on': $\lambda y \lambda x [\text{LOC}(x, \text{UPPER_REGION}(y)) \ \& \ \text{CONTACT}(x,y)]$

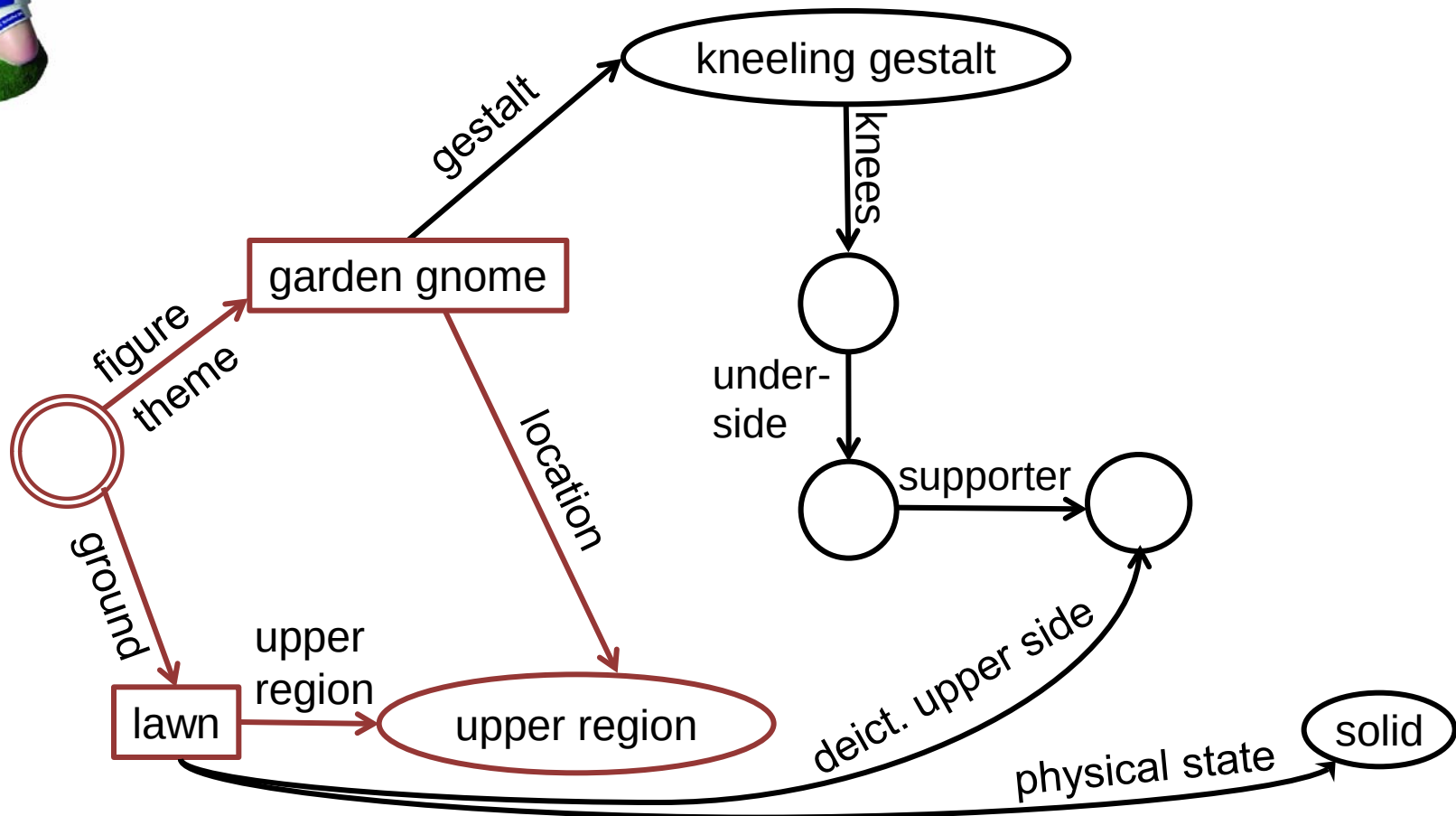


Der Gartenzwerg kniet auf der Wiese.

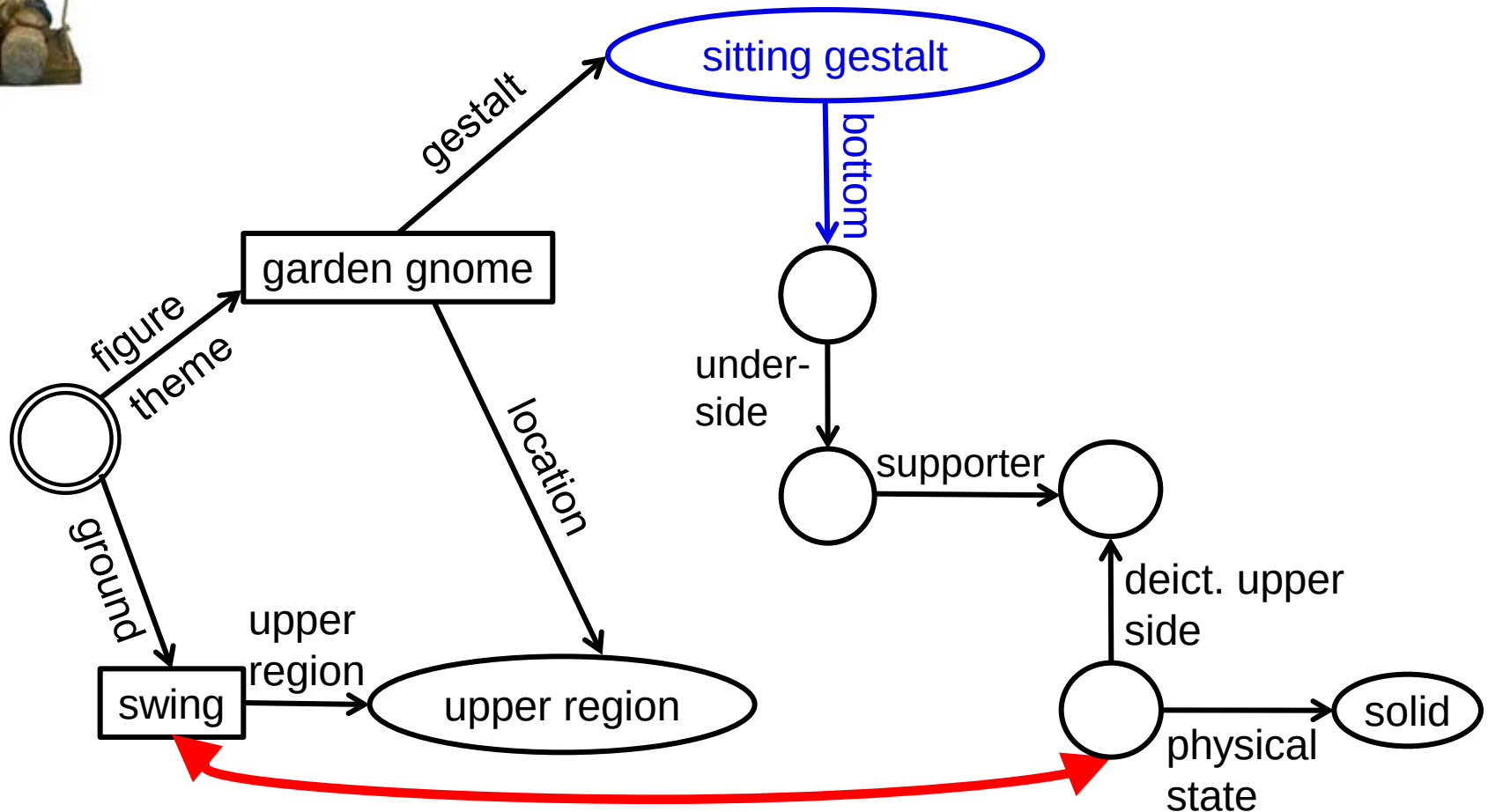
'The garden gnome is kneeling on the lawn.'



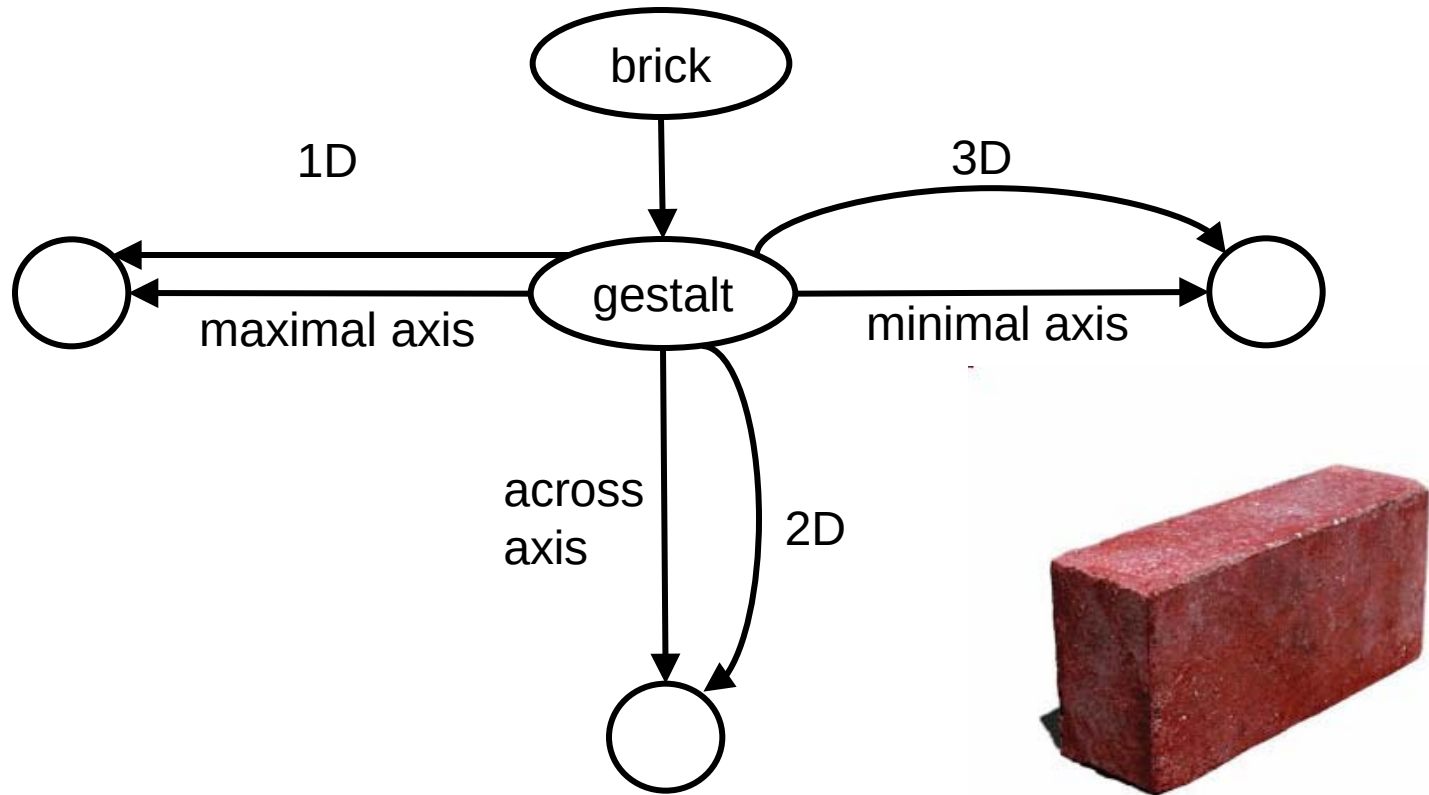
- a. *knien* 'kneel': $\lambda P \lambda x [KNEEL(x) \ \& \ P(x)]$
- b. $\text{Int}(KNEEL(x)) = \exists y [\text{support}_f(\text{d-us}(y), \text{knee}(x))]$
- c. *auf* 'on': $\lambda y \lambda x [\text{LOC}(x, \text{UPPER_REGION}(y)) \ \& \ \text{CONTACT}(x,y)]$



Der Gartenzwerg sitzt auf der Schaukel.
'The garden gnome is sitting on the swing.'



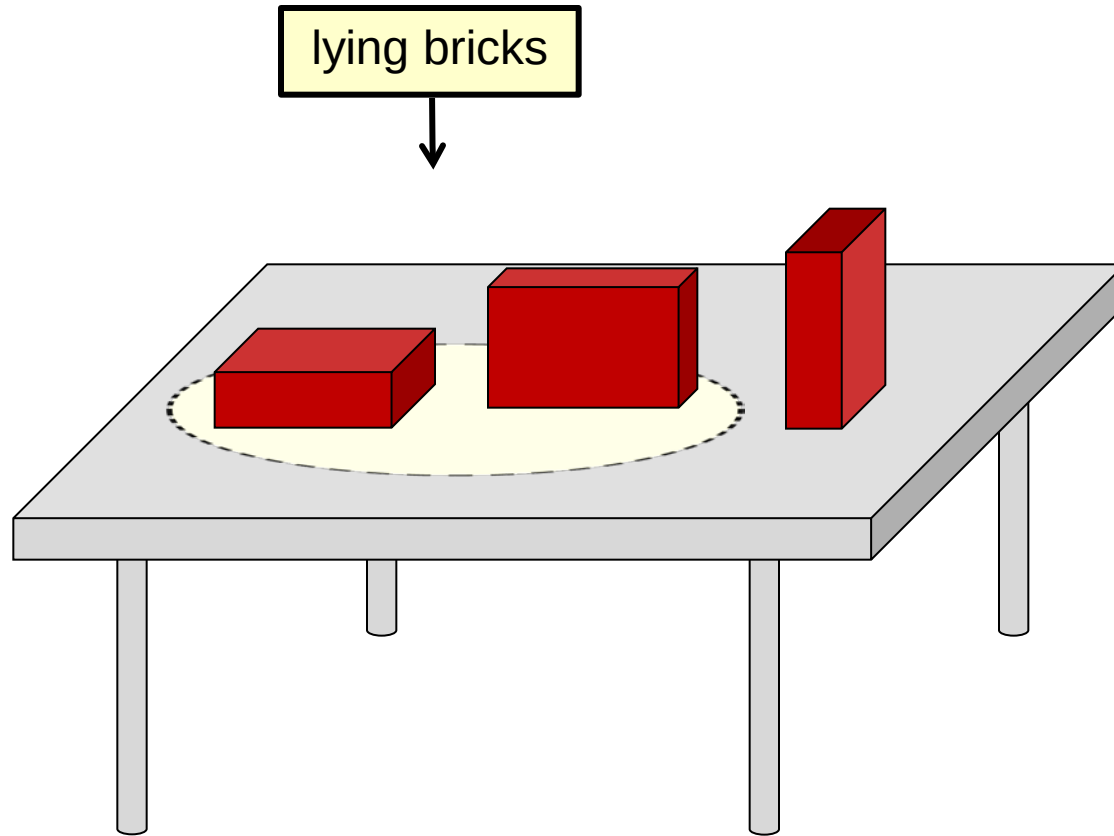
Object schema of *Ziegelstein* 'brick'



1D	2D	3D
Max	Across	Min

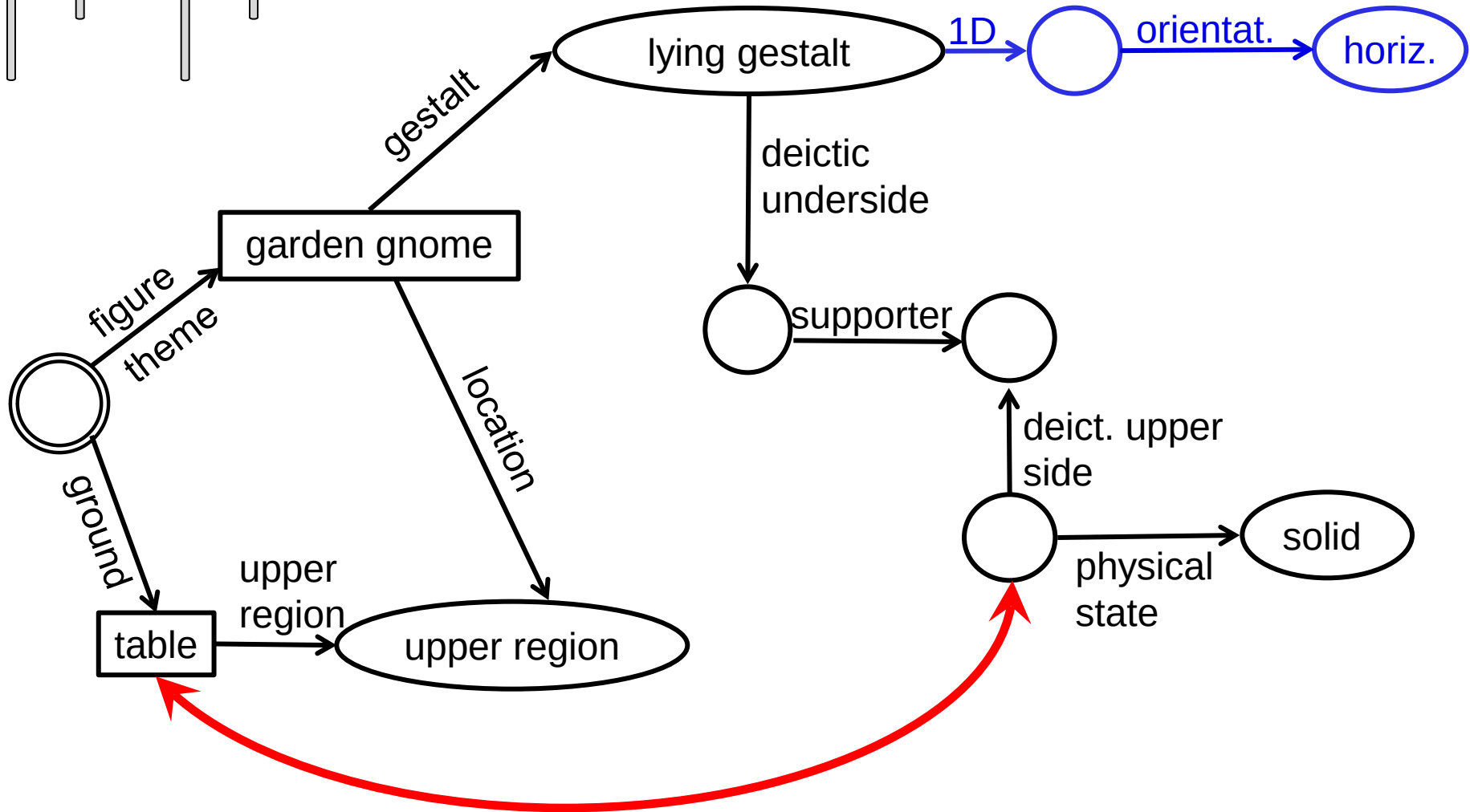
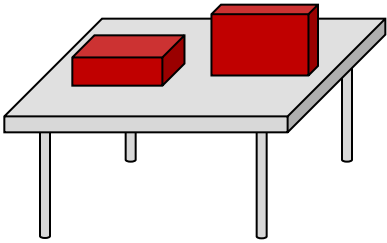
saliency/prominency of axis: 1D > 2D > 3D

Der Ziegelstein liegt auf dem Tisch.
'The brick is lying on the table.'

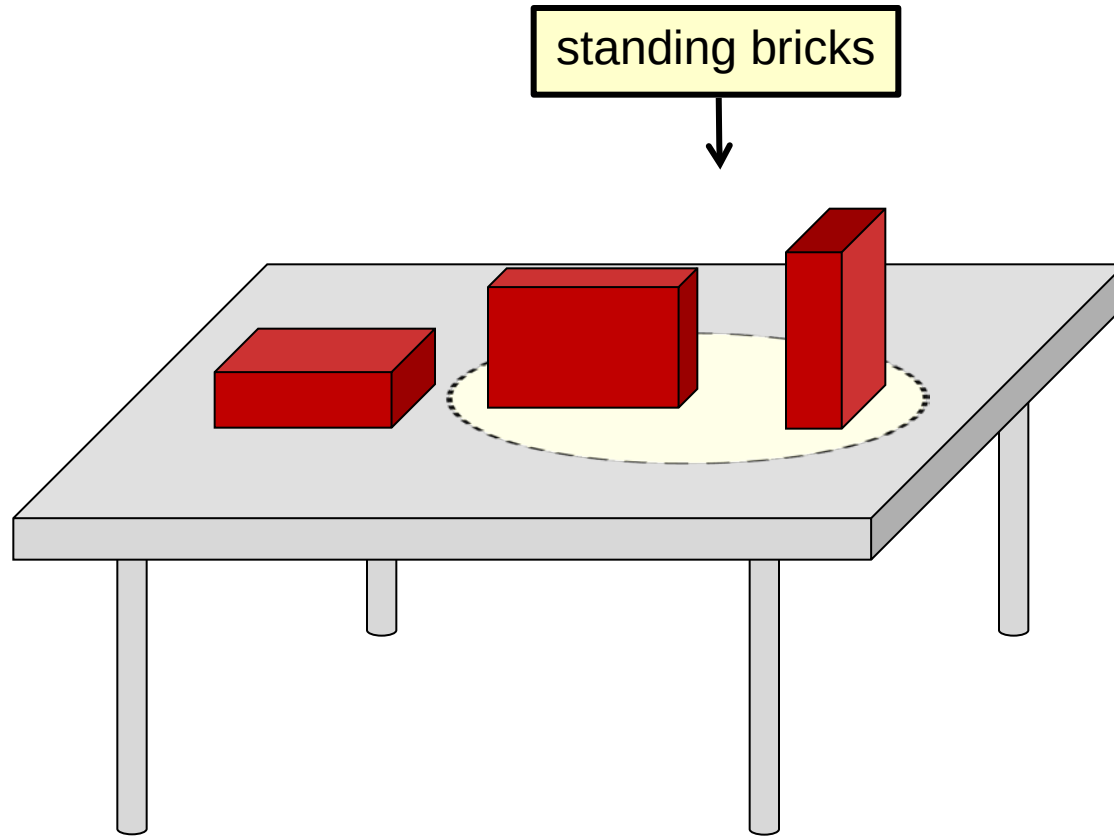


liegen 'lie': maximal axis (1D) = horizontal

Der Ziegelstein liegt auf dem Tisch.
'The brick is lying on the table.'



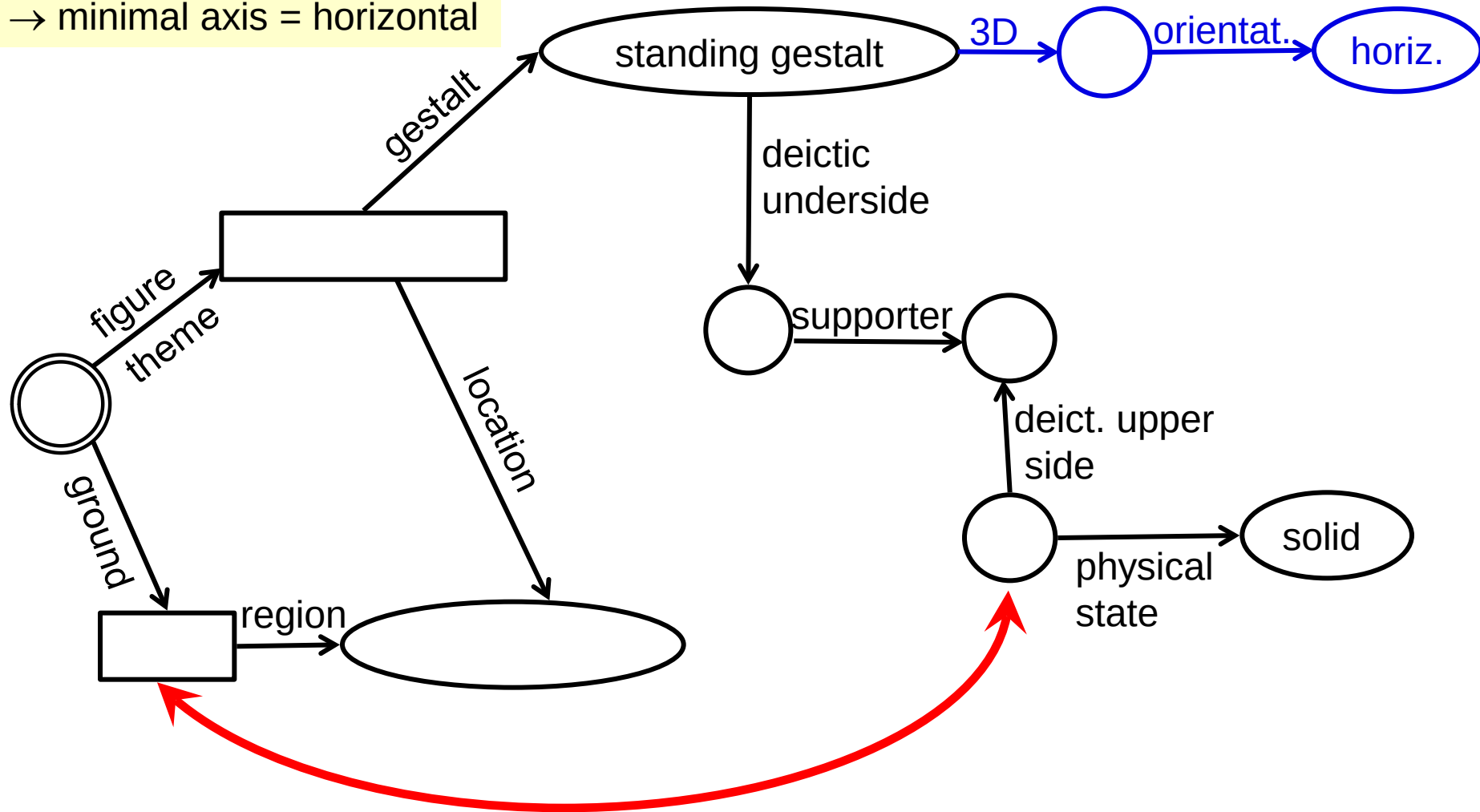
Der Ziegelstein steht auf dem Tisch.
'The brick is standing on the table.'



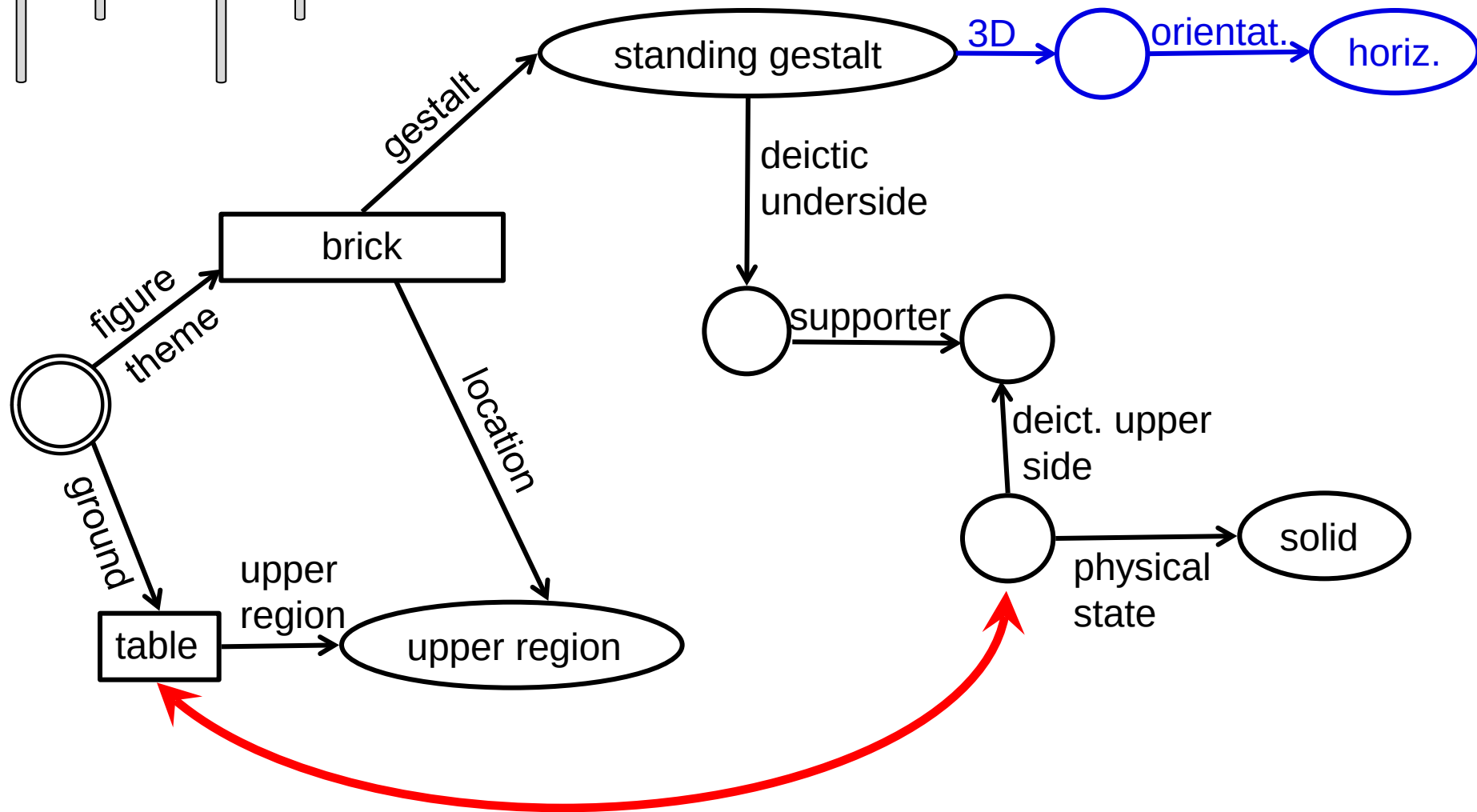
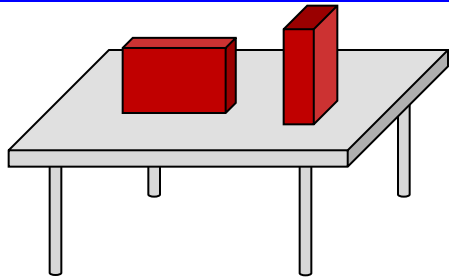
stehen 'stand': minimal axis $\neq$ vertical

stehen 'stand': option 1

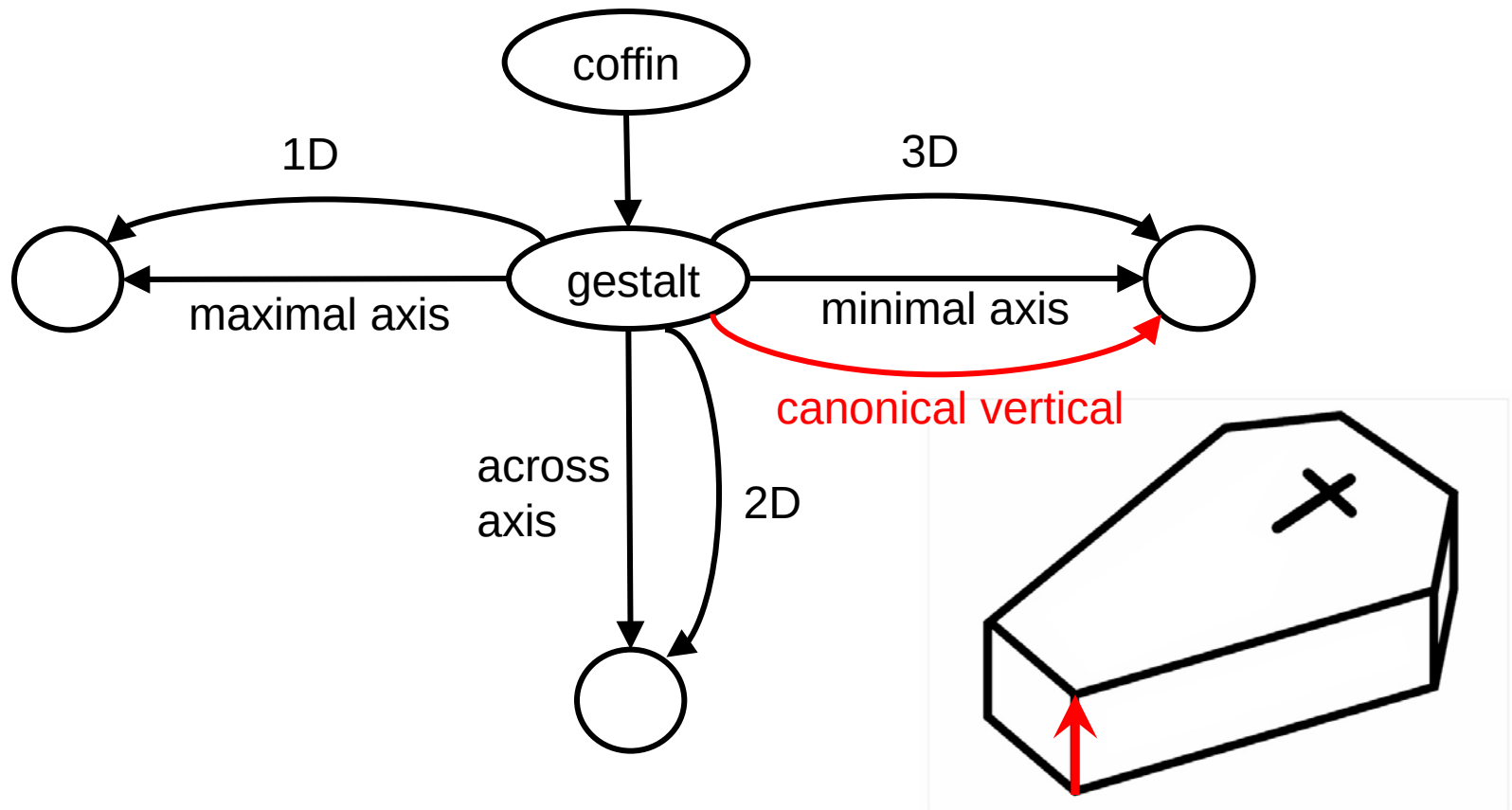
option 1:
minimal axis (3D) $\neq$ vertical
→ minimal axis = horizontal



Der Ziegelstein steht auf dem Tisch.
'The brick is standing on the table.'

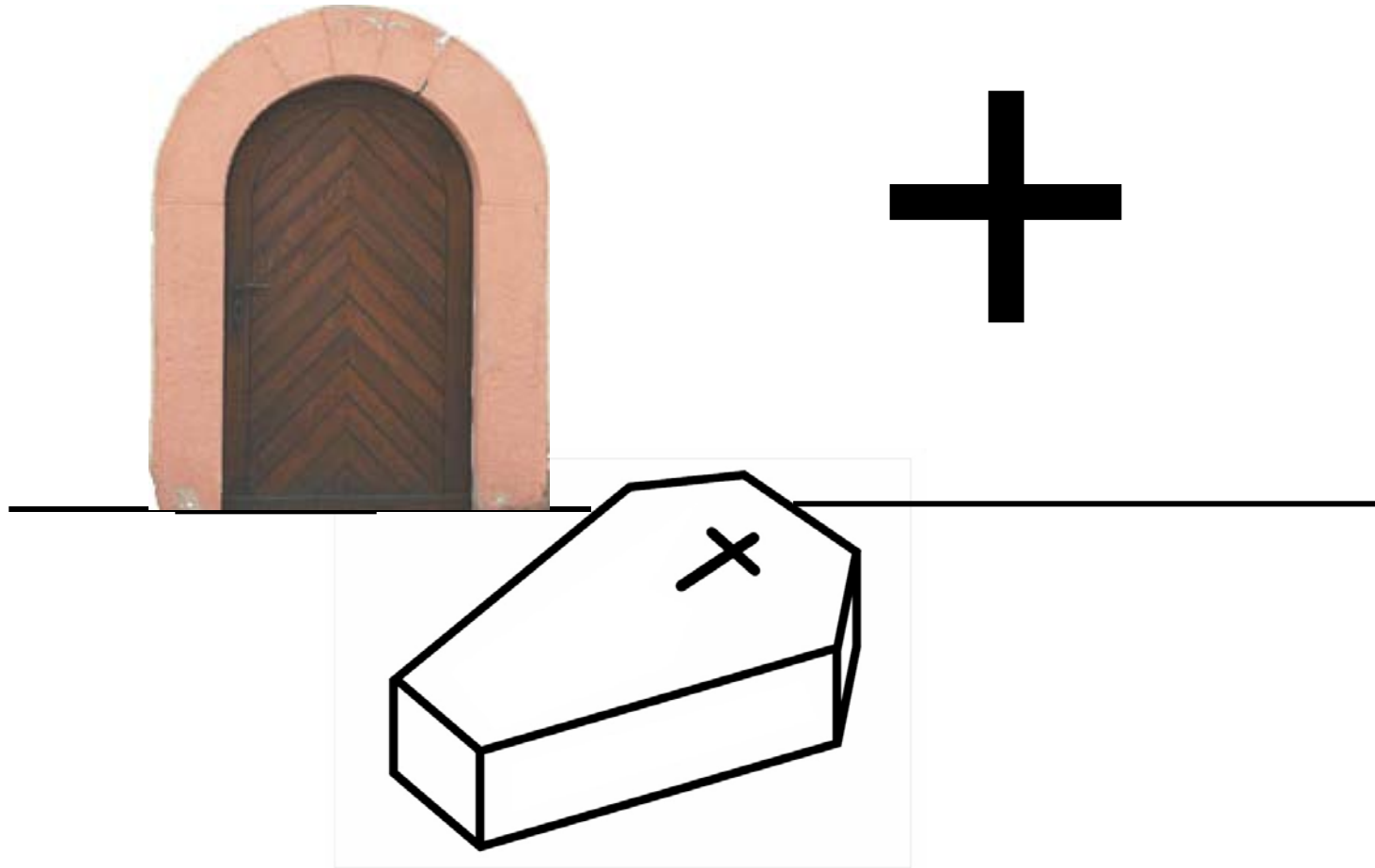


Object schema of *Sarg* 'coffin'



saliency/prominency of axis: 1D > 2D > 3D

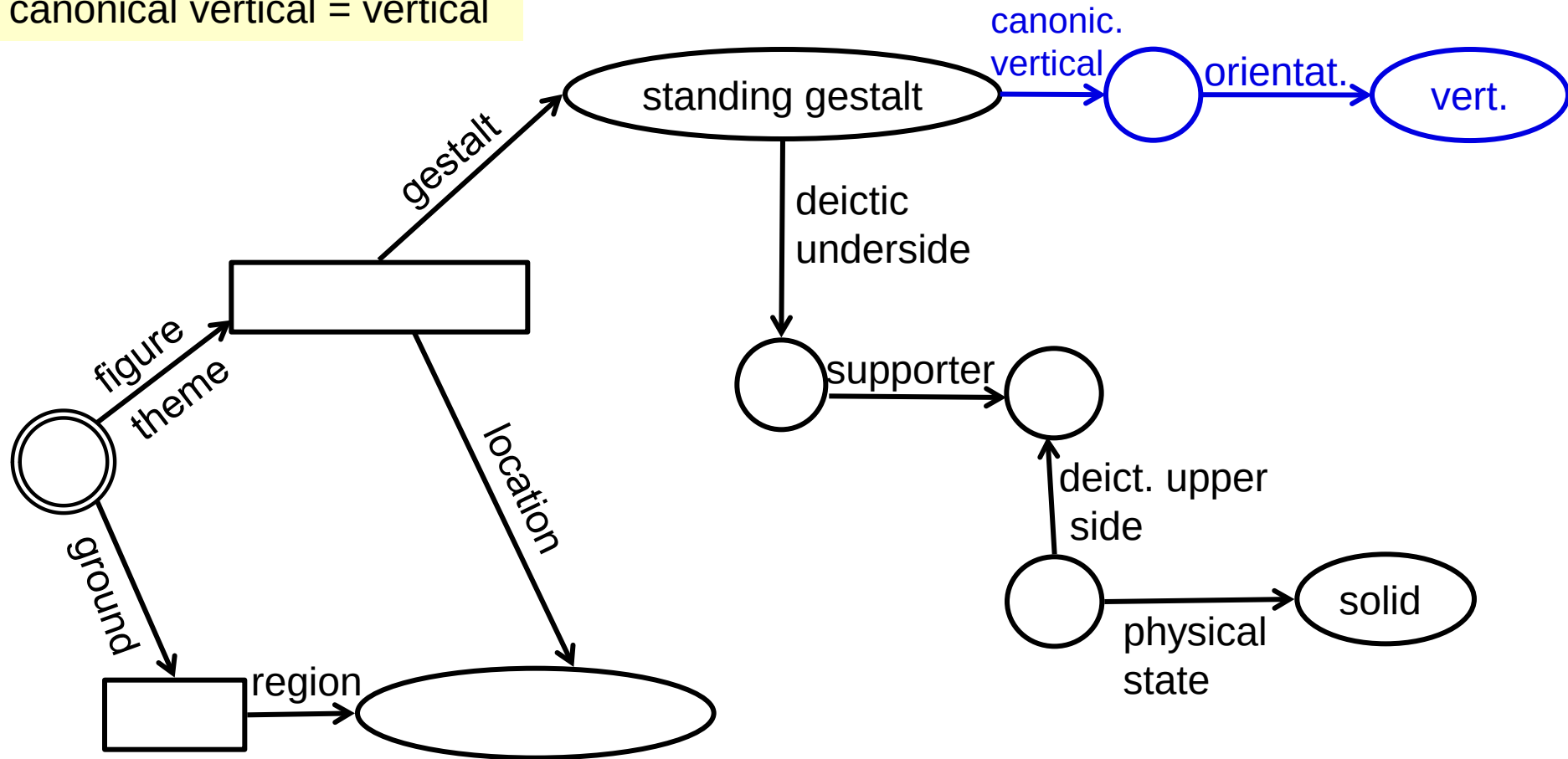
Der Sarg steht in der Kapelle.
'The coffin is standing in the chapel.'



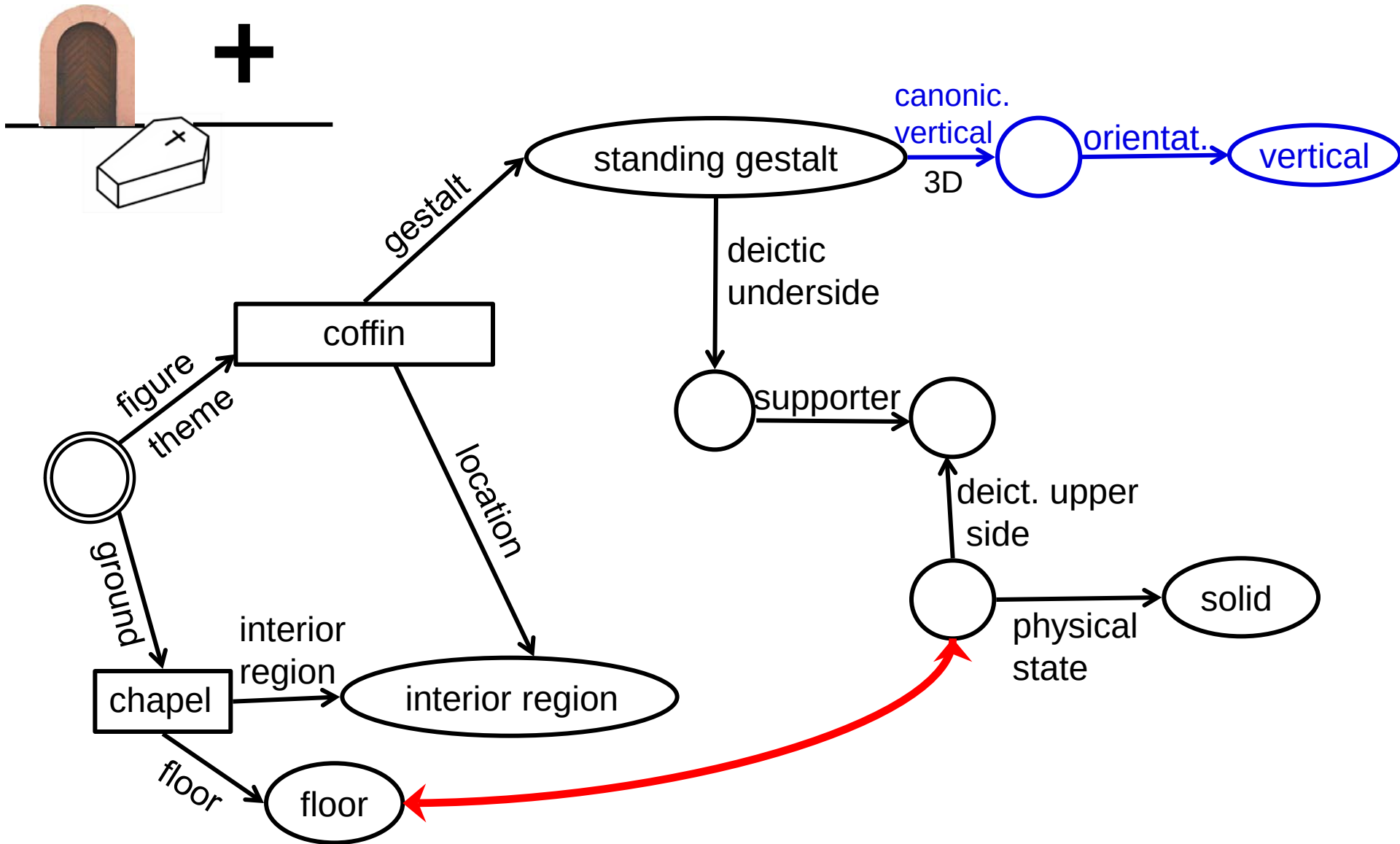
canonical vertical = vertical

stehen 'stand': option 2

option 1:
canonical vertical = vertical



Der Sarg steht in der Kapelle.
'The coffin is standing in the chapel.'



Animacy restriction in French

a. *Maurice se trouve / est allongé / est couché dans le pré.*

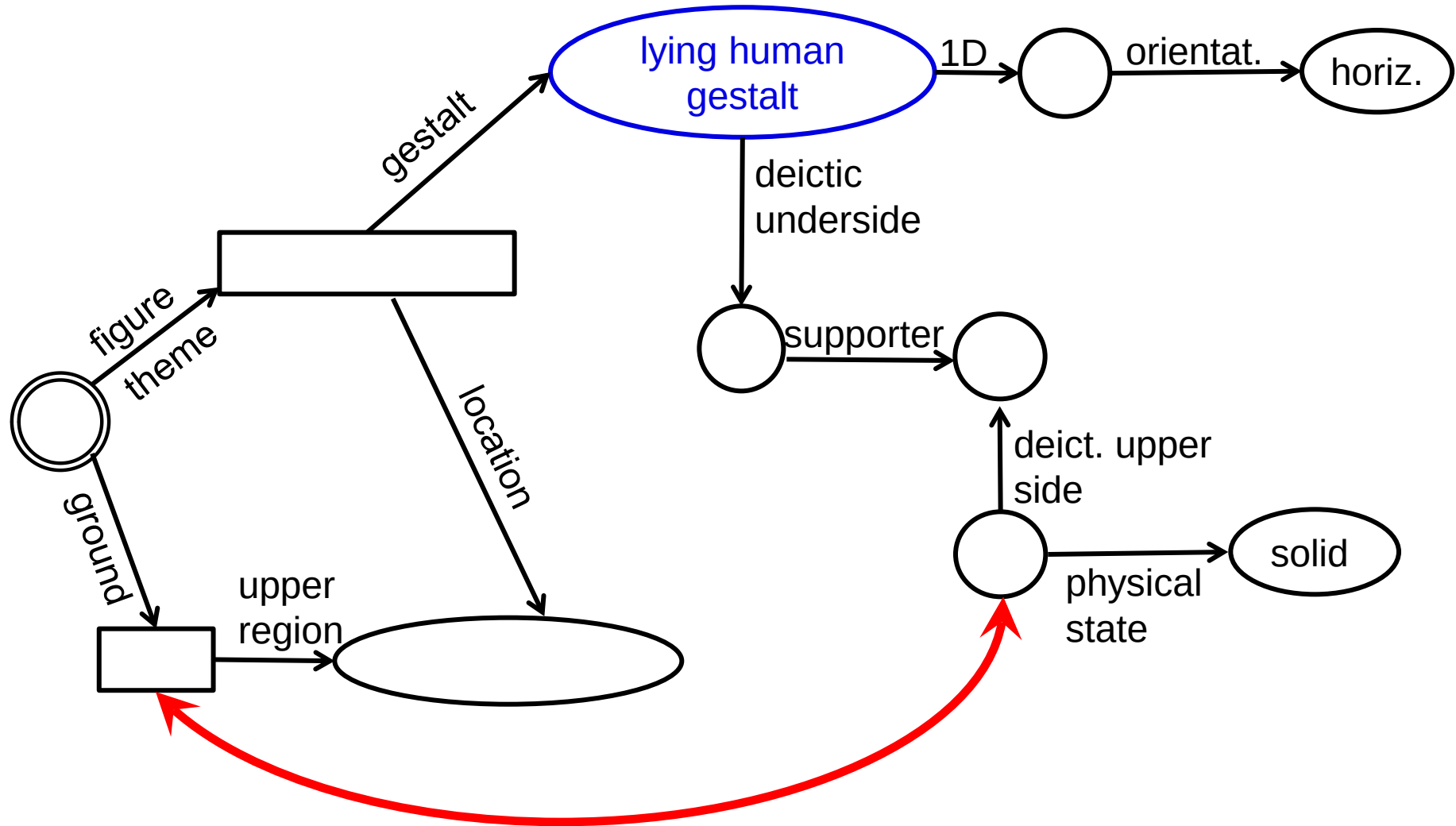
'Maurice is / is lying / is lying on the meadow.'

b. *Le livre se trouve / *est allongé / *est couché sur la table.*

'The book is / *is lying / *is lying on the table.'

Animacy restriction in French

être allongé(e) / être couché(e):



Korean *seta* 'stand'

- a. *Ku kenmwul-i namtaymwun-yeph-ey se-iss-ta.*
the building-NOM south.gate-side-LOC stand-be-IND
'The building stands next to the South Gate.'
- b. **Ku hwapwun-i namdaymwun-yeph-ey se-iss-ta.*
the flower.pot-NOM main.gate-side-LOC stand-be-IND
intended: 'The flower pot stands next to the main gate.'
Song (2002:361)

Song (2002): *seta* 'stand' + non-human subject

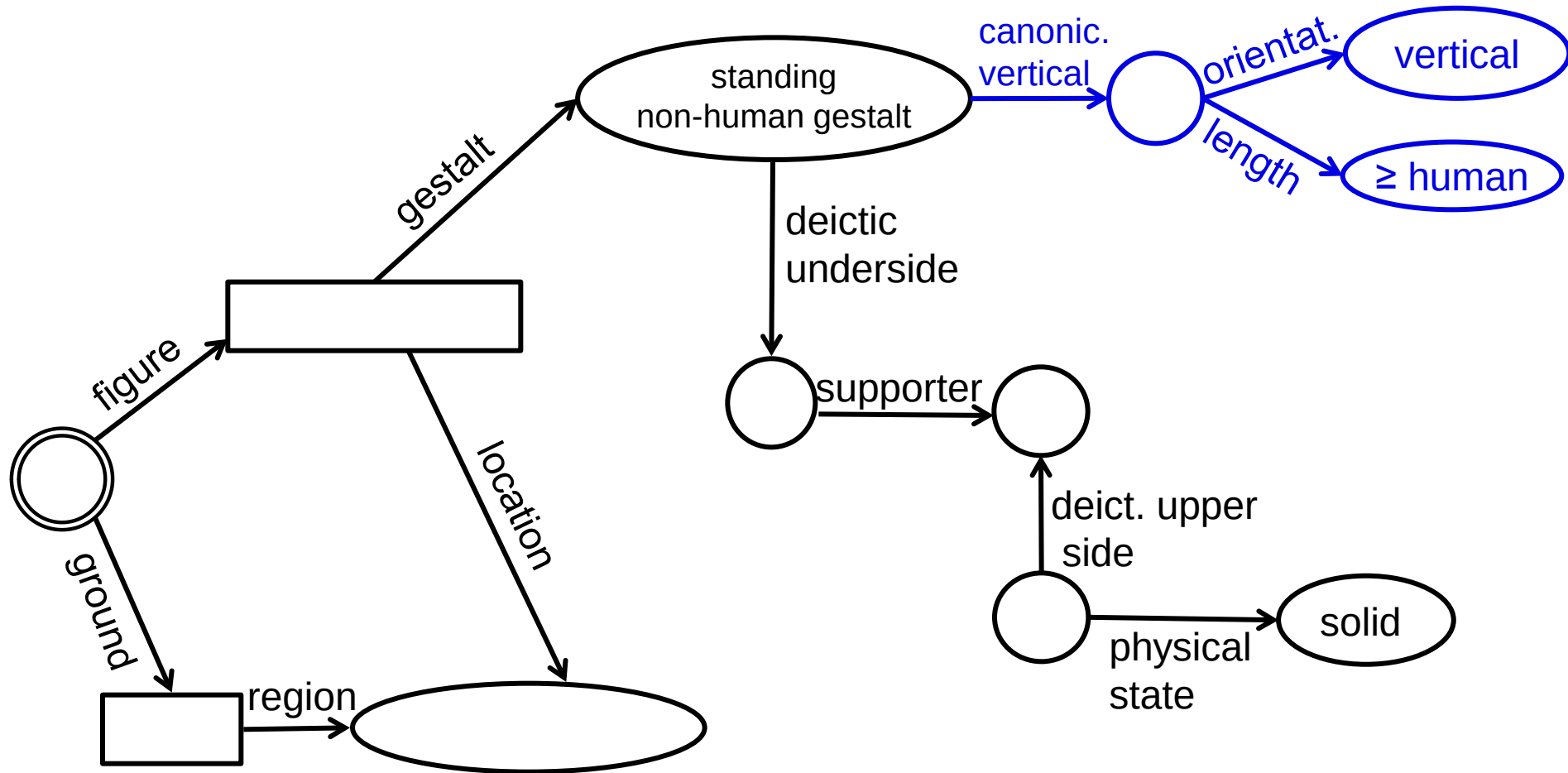
→ HEIGHT(subj. referent) ≥ HEIGHT(human)

Korean seta 'stand'

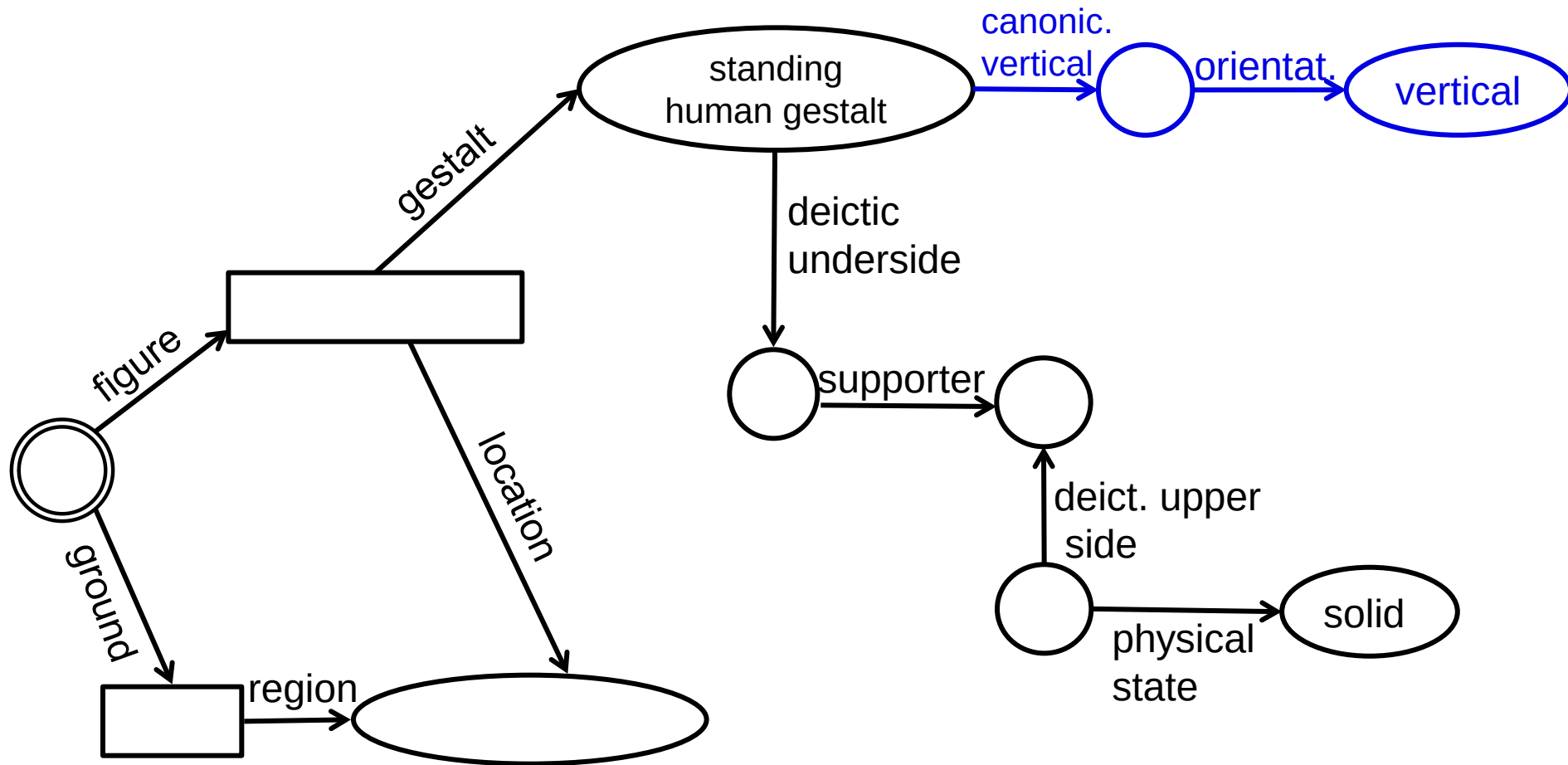
Pekhingem kwungcen-i nay nwun aph-ey se-iss-ta.
Buckingham Palace-NOM my eye in.front.of-LOK stand-be-IND
'The Buckingham Palace is standing in front of my eyes.'



seta 'stand': non-human figure



seta 'stand': human figure



Advantages of a frame analysis of SVLs

- All the elements of a location scenario (figure, ground, locational relation, type of support,...) are captured by frame representations
→ no extra-representational format
- The combinatorics of the elements of a location scenario is captured technically by the unification of the frames of the parts.
- The representation format allows for easy access to the relevant object properties
- Frame representations show a flexible degree of complexity (zooming in and out by expanding/not expanding nodes)



Bleiben Sie **sitzen**, wir
stehen Ihnen für Fragen
zur Verfügung!



Please, remain *seated*, we
will *lie* back and await
your questions!