

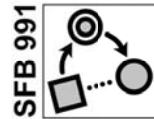
Surfing the frame net

Metonymy and similar phenomena as evidence for a frame approach to concepts

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What's a frame?

A frame is a complex condition on its potential referent.

- The condition is in terms of attributes of the referent and their values. Attributes assign unique values.
- The values of the attributes may themselves carry attributes, and so on, recursively.
- Attributes are defined for certain ontological/conceptual types of possessors and assign values of a certain ontological/conceptual type.
- Various **constraints** may be imposed on the structure, e.g. constraints on the value of an attribute, or on value correlations between attributes.

1. Barsalou frames

According to Barsalou, frames may be the structure of human cognitive representations in general.

Frame Hypothesis

Frames are the general format concepts in human cognition.

Corollary

Frames are the general format of lexical and compositional meanings.

Thus, linguistic semantics can provide evidence for or against the Frame Hypothesis.

Figure 1: Basic structural unit of a Barsalou frame (original)

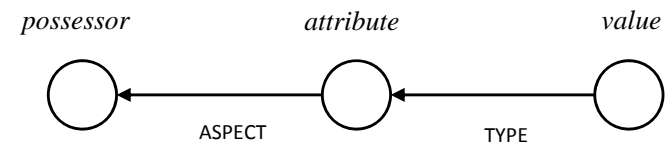


Figure 2: Basic structural unit of a Barsalou frame (restructured)

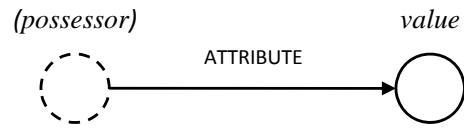


Figure 4: Basic structural unit of a Barsalou frame – extended

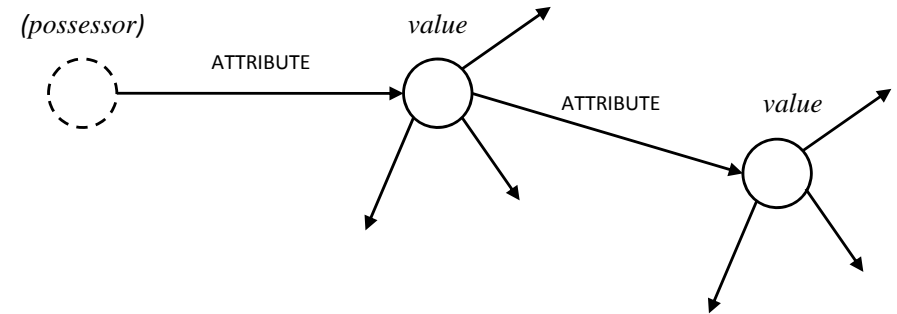
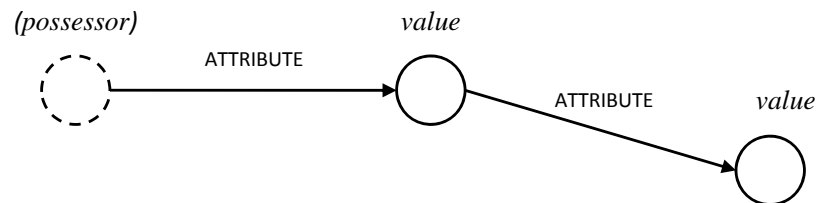


Figure 3: Basic structural unit of a Barsalou frame – extended



Sortal concepts

Concepts that describe their referents in terms of their properties, i.e. in terms of their attributes and the values those take.

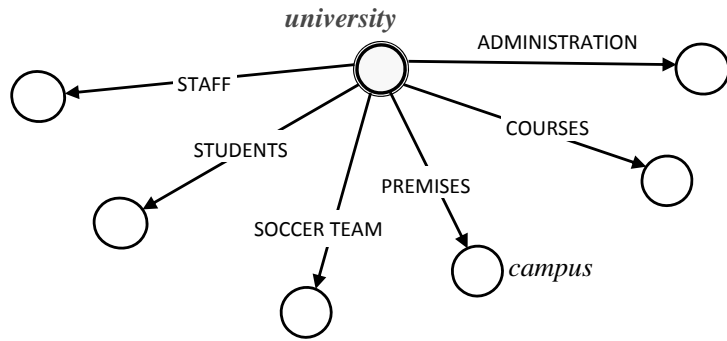
Example:

Lexical meanings of common nouns such as *person, cat, tree, chair, noun* etc.

Frames for sortal concepts have a **characteristic structure**:

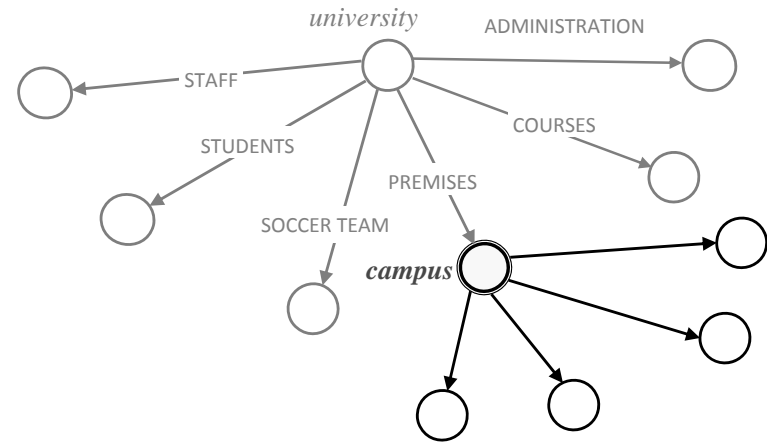
There is a central node representing the potential referent(s) of the frame. Every other node in the frame can be reached from the central node in a finite number of attribute links / by a chain of attributes.

2. Shifting reference in a frame



2. Shifting reference in a frame

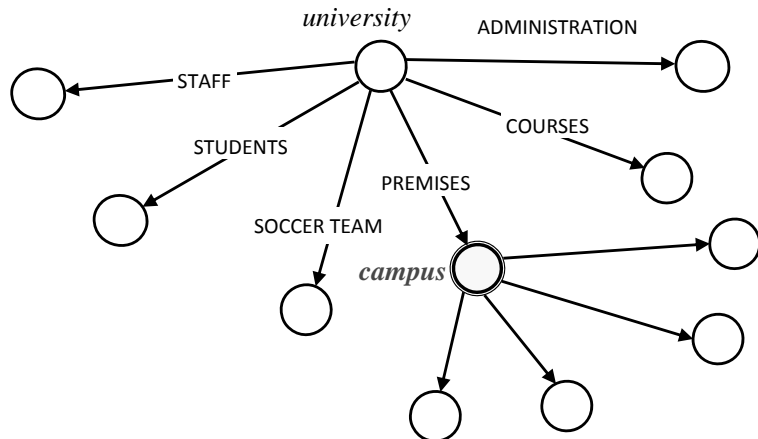
Focusing on the campus



Disconnection of the source attribute (no link from target to source)

2. Shifting reference in a frame

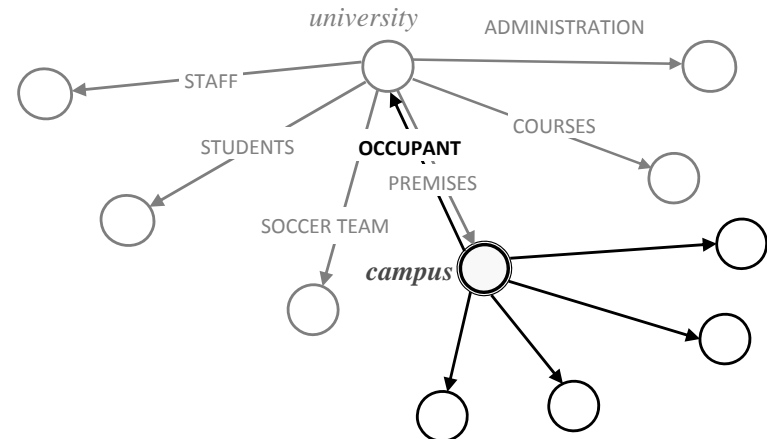
Focusing on the campus



Shift reference to the *campus* node > activation of attributes of the target

2. Shifting reference in a frame

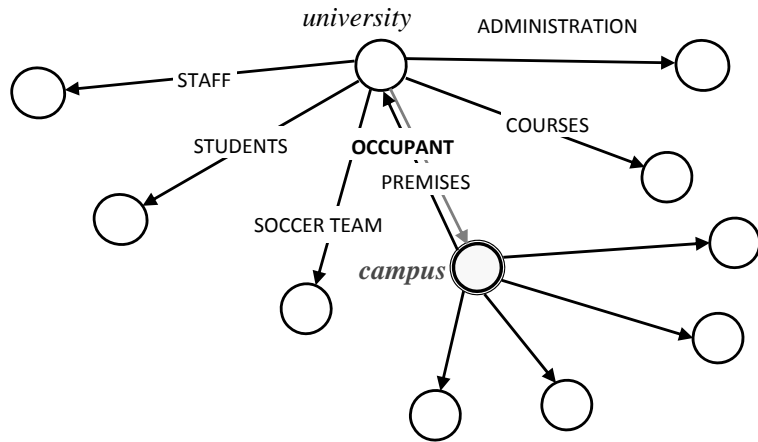
Focusing on the campus



Re-linking the target to the source by inverting the relation

2. Shifting reference in a frame

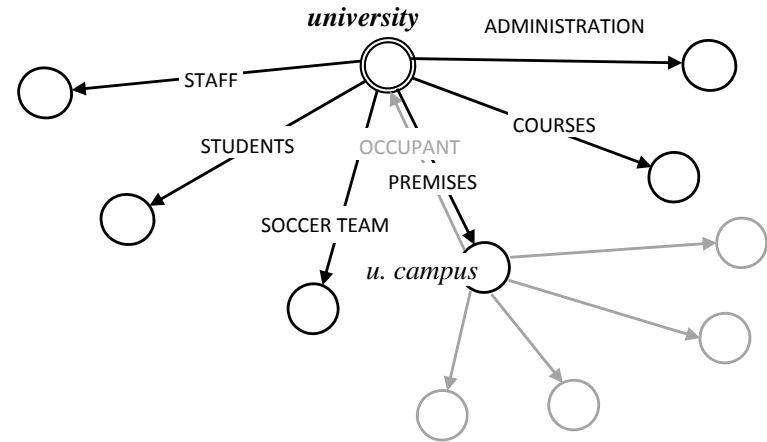
Focusing on the campus



> Thereby re-activating the attributes of the original source

2. Shifting reference in a frame

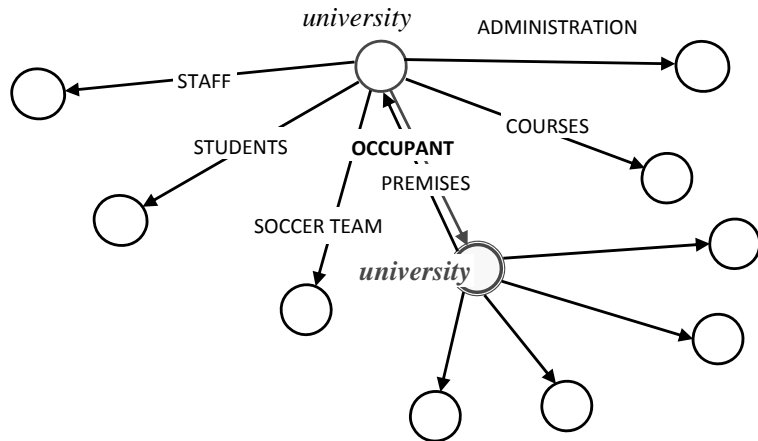
Focusing on the campus



Two metonymically nested concepts

2. Shifting reference in a frame

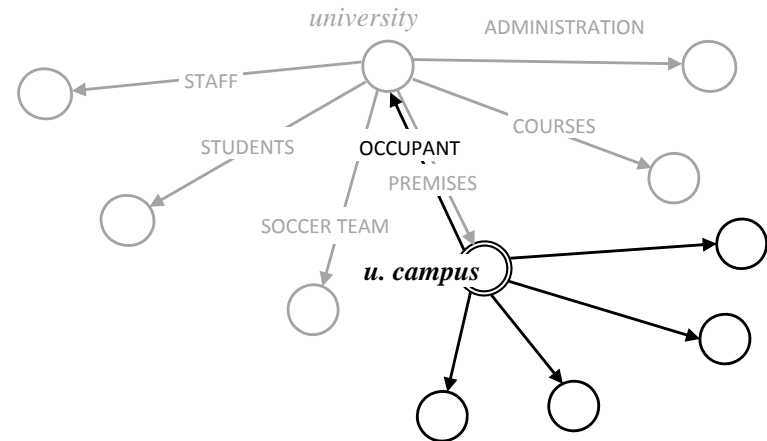
Focusing on the campus



Metonymy

2. Shifting reference in a frame

Focusing on the campus



Two metonymically nested concepts

Shifting the referent of the frame from source R1 to target R2, i.e. to the value of one of its attributes, will

- possibly activate more attributes of R2

The resulting target frame with referent R2 will

- possibly not fulfil the uniqueness condition for the referent of a sortal concept, because there may be no attribute which assigns R1 as its value to R2
- If the recentered frame is to encode a sortal concept (e.g. for 'a campus'), the original frame must provide an inverse attribute connecting R2 back to R1. This is a priori only possible if the attribute involved in the shift is a bijective function.

3.2 Bierwisch: examples of 'conceptual shift'

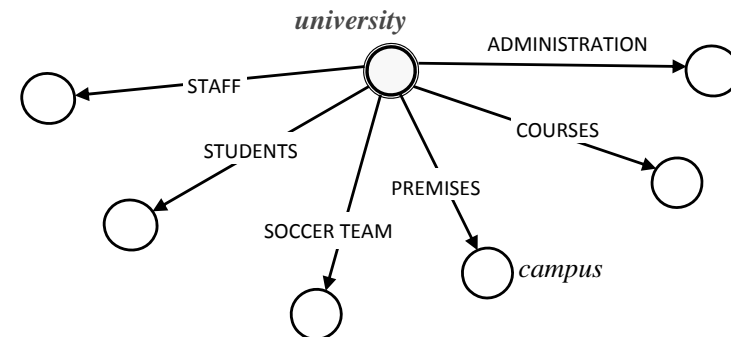
(Bierwisch 1983): multiple metonymies with *university*

- (2)
- The university improved its ranking.*
(= institution)
 - The university will close down the Faculty of Agriculture.*
(= administration)
 - The university won the soccer game against the ministry of defense.*
(= soccer team)
 - The university starts on 3 April.*
(= courses)
 - The university is in the southern part of town.*
(= campus)

3. Metonymy

3.1 Notorious examples

- (1)
- The ham sandwich is waiting for his check.*
 - Moscow declared the Chechen rebels defeated.*
 - Joyce is hard to understand.*
 - We need some new faces around here.*
 - That's a smart paper.*
 - He was beaten up by skinheads.*



3.3 Traditional definitions

Extensional definitions of metonymy: list of ‘metonymical relations’

Metonymy is characterized by certain relations between the referents of the noun in its literal meaning and in its non-literal meaning.

part	→ whole	<i>asshole, skinhead, redneck, new face</i>
equipment	→ carrier	<i>blue helmet, green beret</i>
location	→ institution	<i>Moscow</i>
meal	→ customer	<i>ham sandwich</i>
author	→ work	<i>Joyce</i>
instrument	→ play(er)	<i>bass</i>
person	→ name	<i>I [‘m in the phonebook]</i>
container	→ content	<i>cup</i>

university:
 institution → administration/soccer team/courses/premises/ etc. etc.

3.4 A closer look at metonymical relations: bidirectional uniqueness

- Observation (1) [e.g. Lakoff]:
The metonymical relations are functional (1-to-1):
 For every instance of the source type there is exactly one instance of the target type
 +
 Observation (2) [new]
The inversions of the metonymical relations are functional:
 For every instance of the target type there is exactly one instance of the source type.
- THUS:
 The relations on which metonymies are based, are not arbitrary; they bidirectionally one-to-one relations (bijections).

Intensional definitions of metonymy: same domain, contiguity

- Target and source are “contiguous”.
 (Lakoff & Johnson 1980; Lakoff 1987; Langacker 1987, 2008; Croft 2002)
- Target and source belong to the “same domain”,
 where a domain is “any kind of conception or realm of experience”
 (Langacker 2008: 44).
- Target and source belong to the “same ICM” (Idealized Cognitive Model),
 where a domain is “any kind of conception or realm of experience”
 (Lakoff 2008: 44, Kövecses and Radden 1998).

unique part	↔	(natural) whole	<i>asshole, skinhead, redneck, new face</i>
unique equipment	↔	carrier	<i>blue helmet, green beret</i>
location	↔	institution	<i>Moscow</i>
ordered meal	↔	ordering customer	<i>ham sandwich</i>
author	↔	oeuvre	<i>Joyce</i>
carrier	↔	content	<i>paper</i>
instrument	↔	play or player	<i>bass</i>
person	↔	name	<i>I [‘m in the phonebook]</i>
container	↔	content	<i>cup</i>

Not all attributes in a frame are bijective functions.

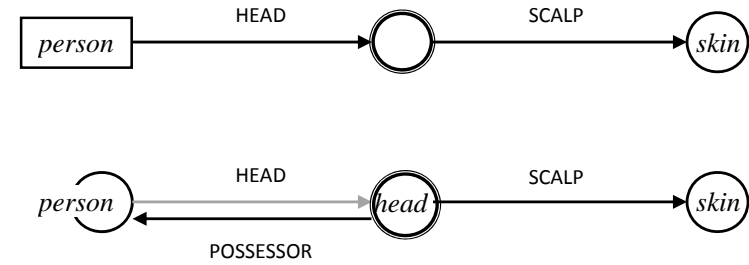
Non-invertible attributes in the ‘university frame’:
 e.g. YEAR OF FOUNDATION, REPUTATION, SIZE, STATE, etc.

A frame perspective on metonymy

- Metonymical relations are **attributes** in the frame of the source concept.
- Metonymy can be understood as a **shift of the central (= referential) node** of the original frame and the creation of an attribute relation from the new central node back to the original one.
- A metonymical shift from one sortal concept to another is only possible if the attribute is a bijective function.

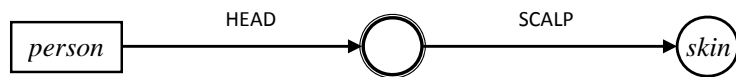
3.5 Selected examples revisited

Figure 2: Frame structure for 'skinhead' (2): sortal concept '(a) skin head'



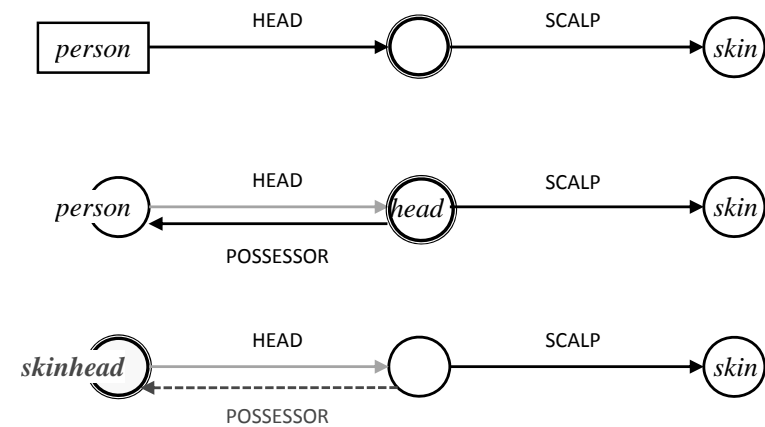
3.5 Selected examples revisited

Figure 2: Frame structure for 'skinhead' (1): functional concept '(the) skinhead of (person)'



3.5 Selected examples revisited

Figure 2: Frame structure for 'skinhead' (3): sortal metonymical concept 'skinhead'

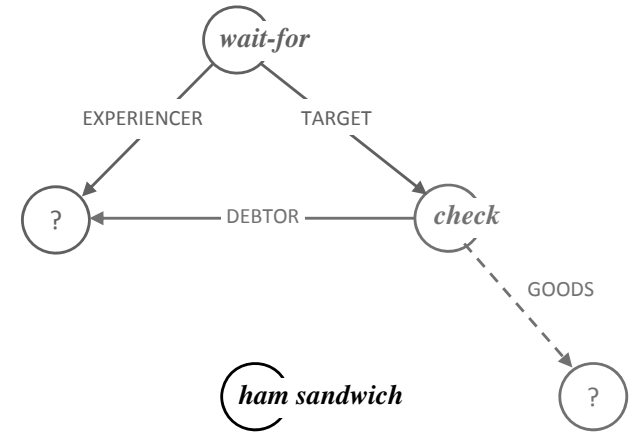


The ham sandwich is waiting for his check.

The sentence invokes a restaurant scenario, triggered by the mention of a ham sandwich and the predication *is waiting for his check* which selects for somebody who ordered something, a customer. The customer being specified by *the ham sandwich* must be retrievable on the basis of this specification. Crucially, frames for an order in a restaurant are such that one and the same item can only be ordered by one customer or customer party. Therefore, there is a 1-1 relation between ordered items and customers (or customer parties). This is what enables the metonymy.

There are five frames involved: **wait-for**, **check**, **ham sandwich**, **order** and **customer**; the latter two are inferred from world knowledge.

Figure 4: "The ham sandwich"



Unify debtor of check with experiencer of waiting

Figure 4: "The ham sandwich"

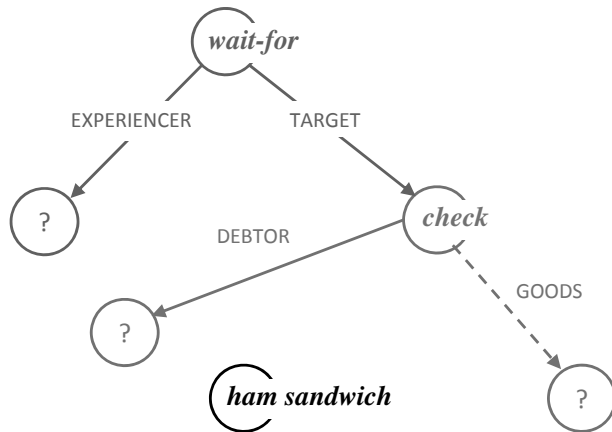
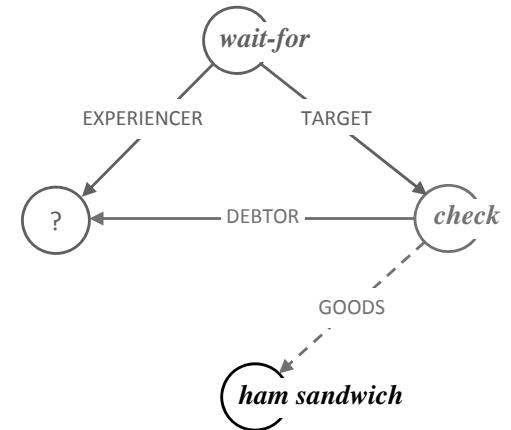
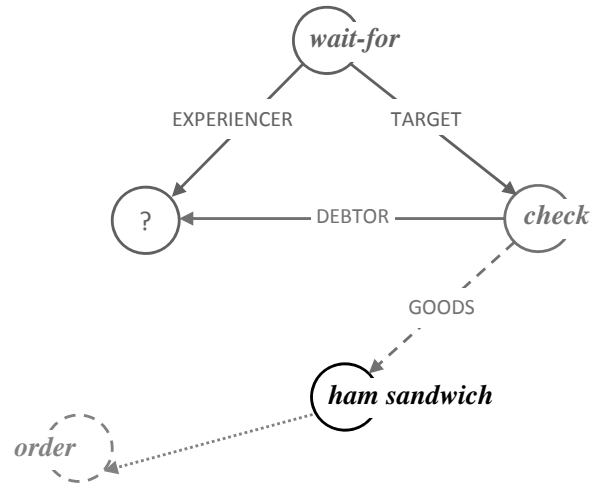


Figure 4: "The ham sandwich"



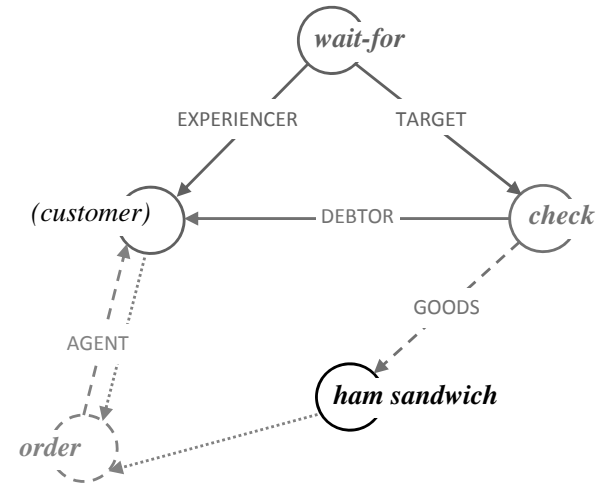
Unify the ham sandwich with the goods the check is for

Figure 4: "The ham sandwich"



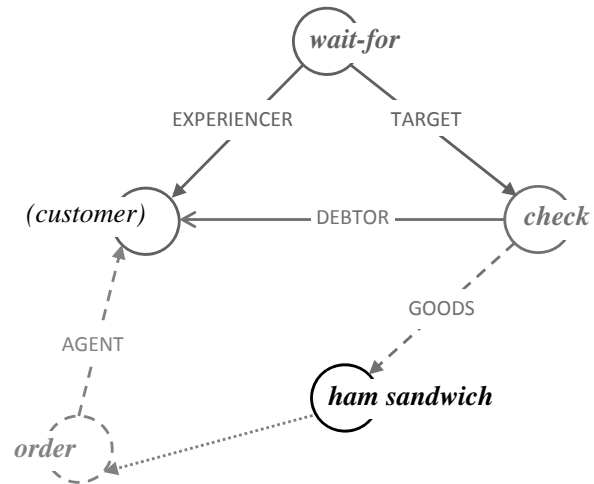
Link the ham sandwich to the event of ordering it

Figure 4: "The ham sandwich"



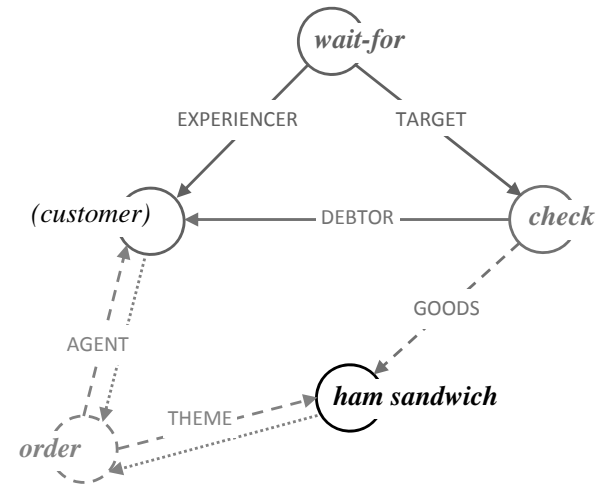
Link the customer to the ordering

Figure 4: "The ham sandwich"



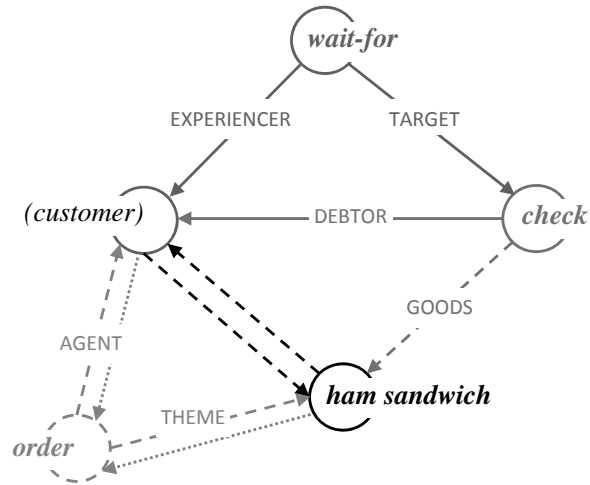
Link the ordering of the ham sandwich to the debtor as the orderer (= customer)

Figure 4: "The ham sandwich"



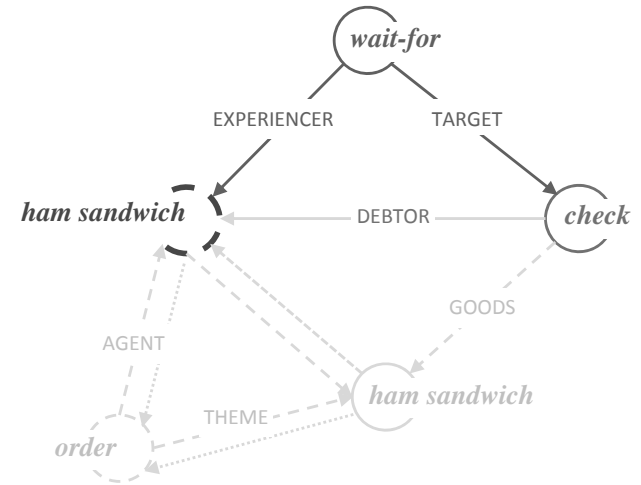
Link the ordering to the ham sandwich

Figure 4: "The ham sandwich"



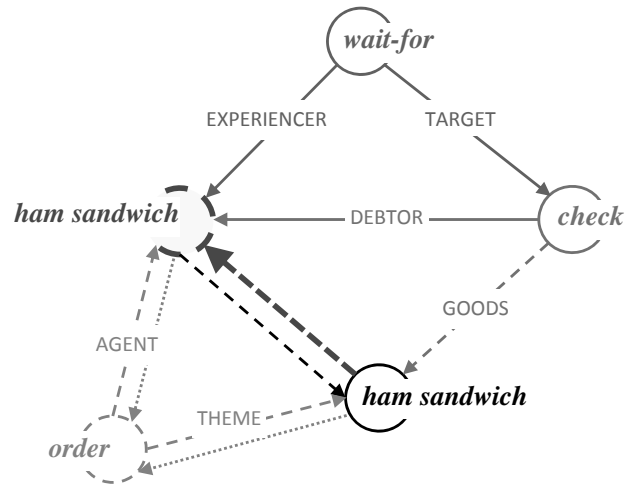
This amounts to a bidirectional link between customer and ham sandwich

Figure 4: "The ham sandwich"



The core predication

Figure 4: "The ham sandwich"



Perform the metonymic shift: 'ham sandwich' → customer who ordered it

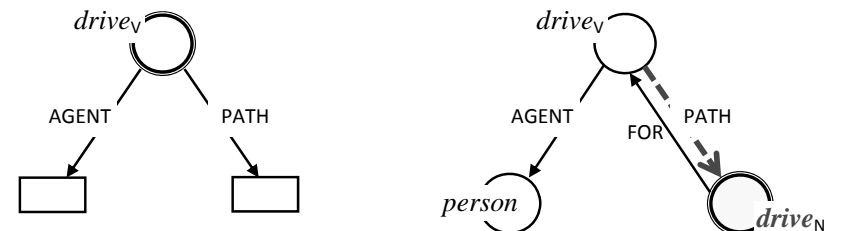
4. Metonymical shifts in word-formation processes

4.1 Conversion and deverbal nouns

Notational convention: open-argument nodes are represented by rectangles.

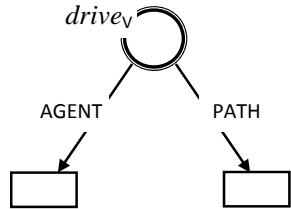
$$(3) \quad V > N \quad \text{drive}_1 : V, \text{drive}_{2, \text{PATH}} : N$$

Figure 4: Frames for $drive_V$ and $drive_N$



to drive

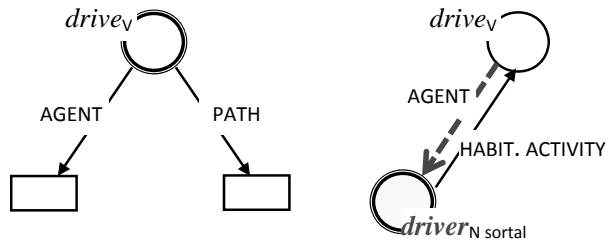
Figure 5: Frames for *drive_V* and *driver_N*



to drive

a driver
sortal

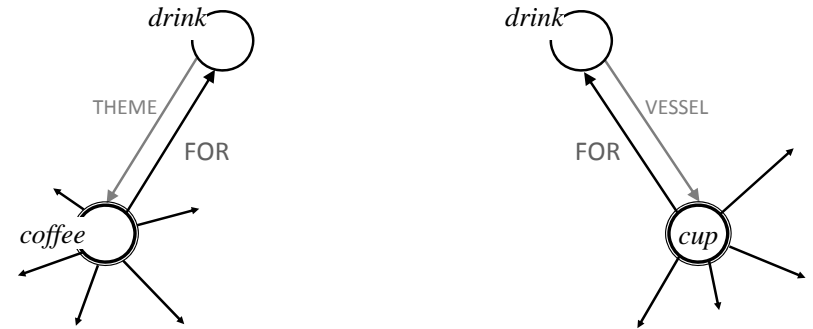
Figure 5: Frames for *drive_V* and *driver_N*



4.2 Certain types of compounds

Bidirectional affordance links

Figure 6: Frames for 'coffee' and 'cup' representing drinking affordance



4.2 Certain types of compounds

Bidirectional affordance links

Figure 6: Frames for 'coffee' and 'cup' representing drinking affordance

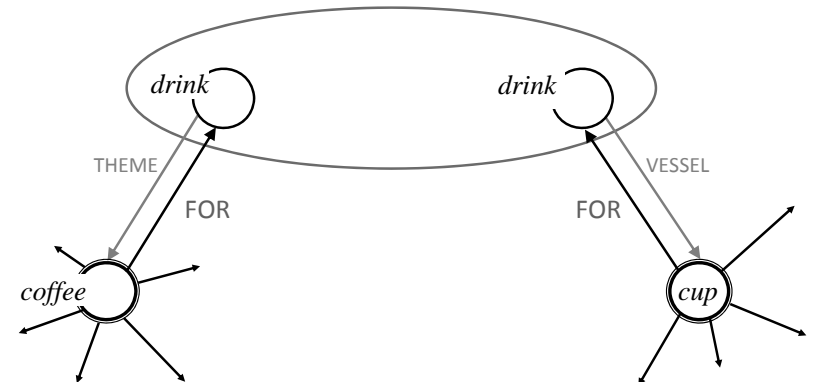


Figure 7: Bare unification

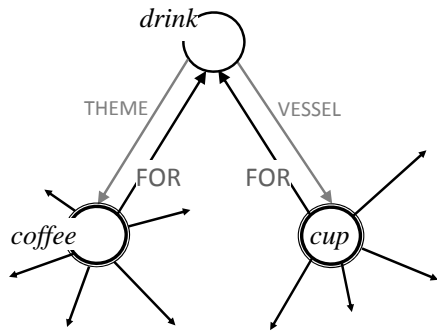


Figure 7: Bare unification

... and adjustment
 (1) deranking of *coffee* node
 (2) redirecting link to *coffee* node

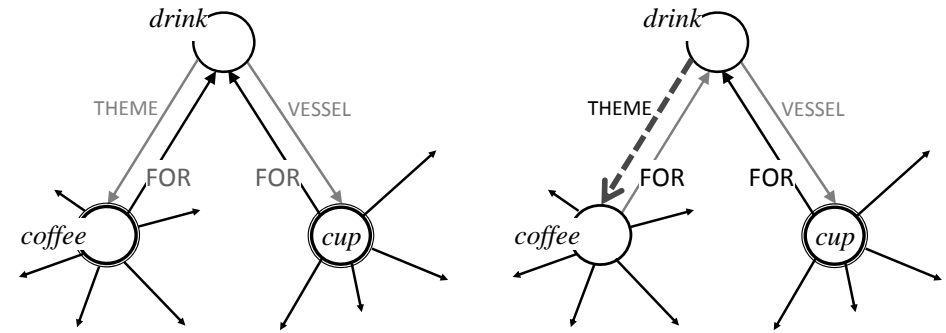
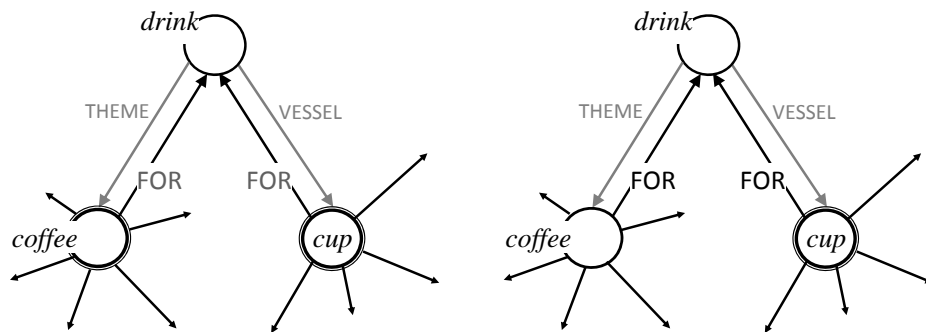


Figure 7: Bare unification

... and adjustment
 (1) deranking of *coffee* node



5. Conclusion

- There are many semantic phenomena that involve *shifting the referent node* in a given frame.
- There are structural constraints on frames for certain types of concept; in particular, with frames for sortal concepts the referent node is a *source*.
- Shifting the referent node as to yield a concept of a certain type is restricted by the structural constraints for that type of concept.
- In particular, if the result of the shift is to yield a sortal concept, the new referent must be able to be construed as the source node of a sortal frame.
- In this case, the shift is only possible if the linking relation is bidirectionally unique (i.e. a bijective function).

- The frame approach predicts that human cognitive systems host a vast network of frames which are interconnected by attribute links.
- THUS: the ubiquitous presence of metonymy as a relation between concepts and between internal elements of concepts provides evidence for the Frame Hypothesis: Concepts have frame structure.
- Attributes in general provide functional links that are 1-to-1 only in one direction. However, certain subclasses of attributes, e.g. mereological attributes, are bidirectionally 1-to-1. This explains and predicts the availability of metonymical relations between concepts.

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