Concept Types
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Concept Frames
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Type Shifts
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A Formal Interpretation of Concept Types and Type Shifts

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Research group on "Functional Concepts and Frames"

CogLang 2010

Concept Types
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Concept Frames
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Type Shifts
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outline

Concept Types
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Concept Frames
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Type Shifts
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outline

1 **Concept Types (Löbner)**

2 **Concept Frames**

3 **Type Shifts**

Concept Types
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Concept Frames
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Type Shifts
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Concept classification

person, pope, house, verb, sun, Mary, wood, brother, mother, meaning, distance, spouse, argument, entrance

Concept Types
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Concept Frames
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Type Shifts
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Concept classification: inherent relationality

non-relational	person, pope, house, verb, sun, Mary, wood
relational	brother, mother, meaning, distance, spouse, argument, entrance

Concept Types
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Concept Frames
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Type Shifts
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Concept classification: inherent uniqueness of reference

	non-unique reference	unique reference
non-relational	person, house, verb, wood	Mary, pope, sun
relational	brother, argument, entrance	mother, meaning, distance, spouse

Löbner

Concept Types
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Concept Frames
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Type Shifts
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Concept classification

	non-unique reference	unique reference
non-relational	**sortal concept** indefinite, demonstrative, plural, quantificational, absolute	**individual concept** singular definite, absolute
relational	**proper relational concept** indefinite, demonstrative, plural, quantificational, relational, possessive	**functional concept** singular definite, relational, possessive

Löbner

outline

1 **Concept Types (Löbner)**

2 **Concept Frames**

3 **Type Shifts**

Concept Types
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Concept Frames
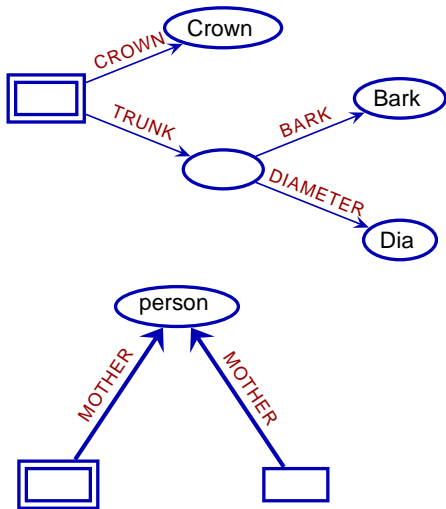●00000000

Type Shifts
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Frames

Barsalou (1992) *Frames, Concepts, and Conceptual Fields*

- Frames provide the fundamental representation of knowledge in human cognition.
- At their core, frames contain **attribute-value sets**.

Concept Types
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Concept Frames
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Type Shifts
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Frames as generalized feature structures

Frames (Petersen 2007)

Frames can be represented by directed connected graphs with

- one central node (double border)
- nodes labeled with types
- arcs labeled with attributes
- no node with two outgoing arcs with the same label
- open argument nodes are marked as rectangular nodes
- uniquely referring nodes are marked with a definiteness marker

Concept Types
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Concept Frames
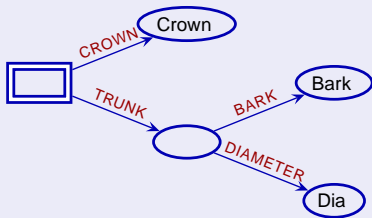○○●○○○○○○○

Type Shifts
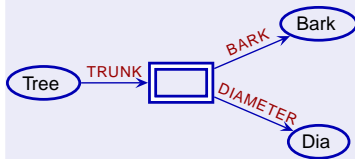○○○○○○○○○○

Frames and functional concepts
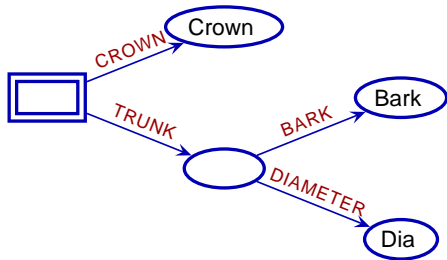
- attributes represent functions
- ⇒ attributes correspond to functional concepts
- ⇒ frames decompose concepts into functional concepts
- ⇒ functional concepts embody the concept type on which categorization is based

Concept Types
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Concept Frames
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Type Shifts
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Sortal concepts

tree-frame

Crown — CROWN

Bark — BARK

TRUNK

DIAMETER — Dia

trunk-frame

Tree — TRUNK

Bark — BARK

DIAMETER — Dia

Concept Types
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Concept Frames
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Type Shifts
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Individual concepts

Mary-frame

predicate constant 'Mary':

pope-frame

predicate constant 'pope':

Concept Types
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Concept Frames
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Type Shifts
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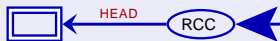
Non-relational concepts

sortal concepts

most simple frame:

- one open argument (=central node)
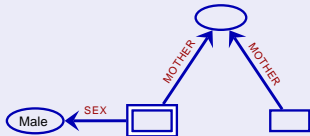- no path from a definite node to the central node

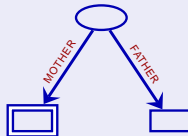### individual concepts

most simple frame:

- one open argument (=central node)
- there is a direct path from a definite node to the central node

Concept Types
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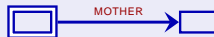Concept Frames
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Type Shifts
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Proper relational concepts

brother-frame

co-parent-frame

child-frame

Concept Types
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Concept Frames
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Type Shifts
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Functional concepts

head-frame

predicate constant 'head':

haircolor-frame

predicate constant 'haircolor':

Concept Types
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Concept Frames
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Type Shifts
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Relational concepts

proper relational concepts

most simple frame:

- two open arguments
- no direct path from the other open argument to the central node

functional concepts

most simple frame:

- two open arguments
- there is a direct path from the other open argument to the central node

Concept Types
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Concept Frames
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Type Shifts
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Summary: concept types and their frames

sortal concepts

most simple frame:

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Examples: stone, teenager, tree

individual concepts

most simple frame:

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Examples: pope, Mary

proper relational concepts

most simple frame:

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Examples: sister, son, finger

functional concepts

most simple frame:

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Examples: mother, trunk, color

Concept Types
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Concept Frames
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Type Shifts
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outline

Concept Types
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Concept Frames
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Type Shifts
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Type shifts: example

Concept *mother* (cf. Gerland and Horn 2010)

(1) Maria is Peter's mother.

(2) Maria is a mother.

(3) Maria is the mother.

(4) Maria is a mother of Peter.

Concept Types
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Concept Frames
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Mother **as a functional concept**

(1) Maria is Peter's mother.

- Lexicalized concept type.

Concept Types
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Concept Frames
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Type Shifts
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Mother **as a sortal concept**

(2) Maria is a mother.

- Type shifts can close or open arguments.

Concept Types
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Mother as an individual concept

(3) Maria is the mother.

- Context can introduce definiteness.

Concept Types
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Concept Frames
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Mother **as a proper relational concept**

(4) Maria is a mother of Peter.
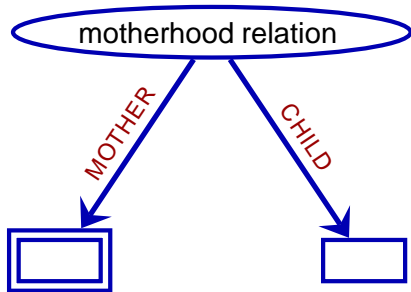
- Type shifts can transform the frame structure of a concept -
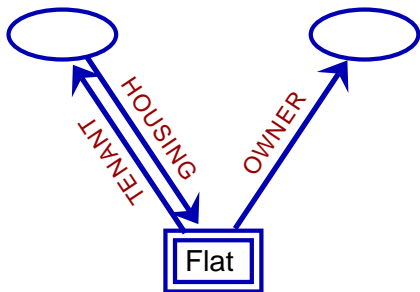 but they need a strong context for that.

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Type shifts: example

Concept *flat*

(5) Many flats are offered in the newspaper.

(6) This flat is a flat of John, he owns more than five.

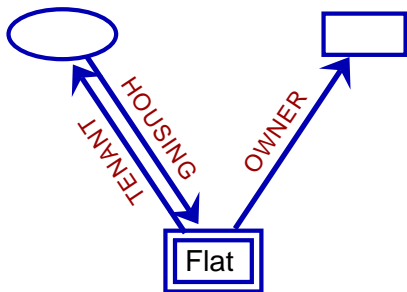**(7)** The flat of Mary is huge and the rent is reasonable.

Concept Types
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Concept Frames
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Flat as a sortal concept

(5) Many flats are offered in the newspaper.

Concept Types
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Concept Frames
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Flat as a proper relational concept

(6) This flat is a flat of John, he owns more than five.

Concept Types
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Concept Frames
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Flat as a functional concept

(7) The flat of Mary is huge and the rent is reasonable.

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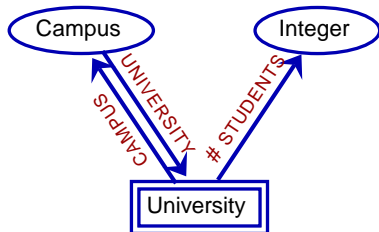0000000000

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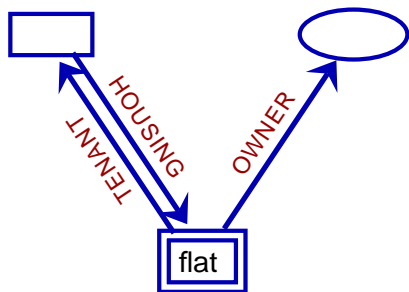
Summary and outlook

Summary

- Type shifts occur in language.
- Type shifts can be modeled in frames.
- Types can be shifted arbitrarily.
- Unusual uses need a strong context for the shift.

Outlook

- metaphoric shifts
- metonymic shifts

Literature

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