Metaphor
and its Computational Processing

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Einführung in der Pragmatik & Diskurs

July 7, 2014

Metaphors

Brad Pitt ist ein Chamäleon.

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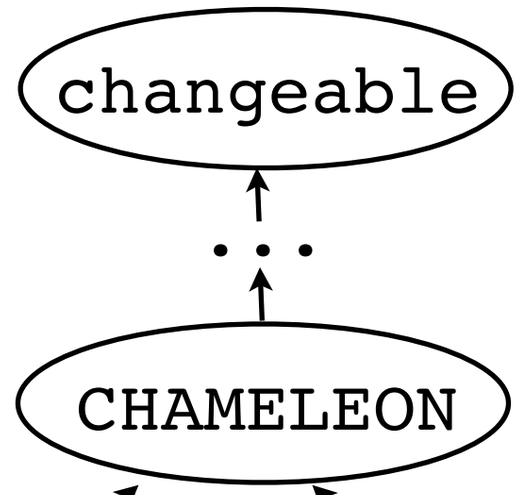

Metaphors

- Figurative language (Sprach-Bilder) of various sorts

Hans ist ein Trampeltier.

Der Chef ist gestern explodiert.

Im Forum treibt sich ein Troll herum.

All the world's a stage,
And all the men and women merely players;
They have their exits and their entrances;

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- Violate the Qualitäts-Maxime - actual meaning can be difficult to deduce (especially automatically)
- Nevertheless often more appropriate than possible literal (non-figurative) expressions (cf. Quantitätsmaxime, Maxime der Art und Weise)
- Metaphors are common in everyday speech, and new ones are always coming into being
    - productive & creative phenomenon

Overview

- Classical theories of metaphor
  - Comparison theory (Vergleichstheorie)
  - Interactionist theory (Interaktionstheorie)
  - Concept mappings (Konzept-Mappings)
- Automatic learning of metaphors (as concept mappings)
- Application of concept mappings for unknown metaphors
- Concept mappings for creative nominal metaphors

Comparison theory (Miller 1979)

- Metaphors are actually comparisons
- Metaphorical expression and literal meaning have at least one shared property
- Nominal metaphors (with *to be/sein*)

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- Hans ist *wie ein Trampeltier.*
- there exist F'(Trampeltier) and G'(Hans) such that F' ~ G' (F and G are comparable)
- F' = manner of locomotion; G' = manner of dealing with other people's feelings

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- Predicative metaphors

Maria verschlingt das Buch.

  - there exist verschlingen'(x,y) and f'(Maria,z) such that buch(z) and verschlingen'(*,y)v ~ f'(*,z_{buch}) -> "Maria liest so Bücher, wie andere giereg essen."

Comparison theory (Miller 1979)

- Metaphors and context, sentential metaphor (Satzmetaphern)

A: Wie war der Chef gelaunt?
B: Der Löwe brüllte.

  - expression is reinterpreted because its literal meaning is irrelevant in the context
  - there exists a scenario G'(x) such that G'(x) ~ [brüllen'(y) ^ löwe'(y)]
  - "Das Brüllen des Löwen ist wie der Chef, der seinen Ärger zum Ausdruck bringt"

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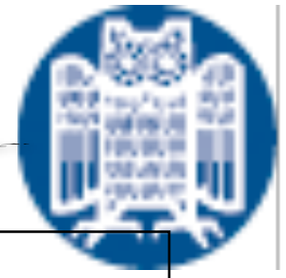
- Problems with this approach
  - the problem of interpretation is simply postponed: what is the meaning of "so sein wie"/ "is like"?
  - the comparisons can be very abstract (e.g. *jmd. ausquetschen ~ ??)*

Interactionist theory (Levin 1977, Van Dijk 1972, Weinreich 1966)



- Lexeme meanings are feature structures

Blick

+ abstract
- living
+ human expression (...)

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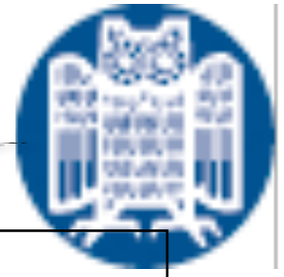

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- Verbs require certain features from their complements

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gefrieren

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SUBJ: + liquid

Sein Blick gefriert.

- Metaphors are interpreted via “inheritance” of features
  - either the verb features can be modified: “+ liquid” can be deleted, or “+ abstract” (e.g.) can be added to the restrictions (Sein Blick erstarrte unter Kälteeinfluss)
  - or the complement: “+ liquid” is added to the feature structure of *Blick* (der flüssige, abstrakte, menschliche Ausdruck fror ein)

Interactionist theory (Levin 1977, Van Dijk 1972, Weinreich 1966)

- The metaphor has been "processed" (we have a valid semantic representation)
- Problems of this approach:
  - the border between the literal and metaphoric readings is often unclear, esp. for strongly conventionalized metaphors

Peter	*kam eilig* *rannte* *hastete* *stürzte* *schoss* *pfiff*	*die Treppe herunter.*

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    Peter [*kam eilig* / *rannte* / *hastete* / *stürzte* / *schoss* / *pfiff*] *die Treppe herunter.*

  - many metaphors don't violate feature-restrictions (consider also Satzmetaphern)

    (Hans war da.)
    Ich habe das Trampeltier gefüttert.

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    (Hans war da.)
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  - the schema is limited, inflexible, and says little about the actual analogy being made (+flussig Blick ???)

Concept mappings (Lakoff & Johnson 1980)

- We understand one (literal, often abstract) concept through another (concrete) metaphorical concept
- Through this mapping, qualities/terms/etc. from the metaphorical concept (= SOURCE/QUELLE) are mapped onto the literal concept (= TARGET/ZIEL)

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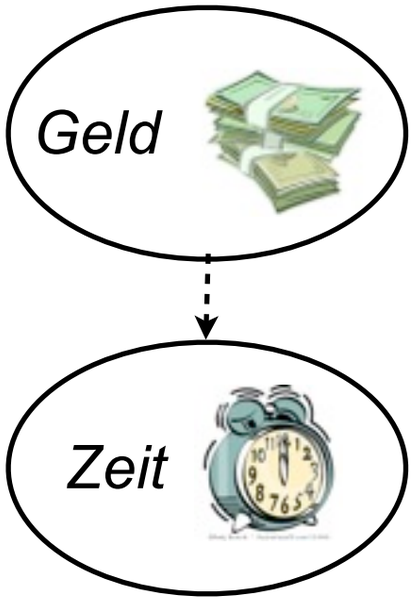
QUELLE



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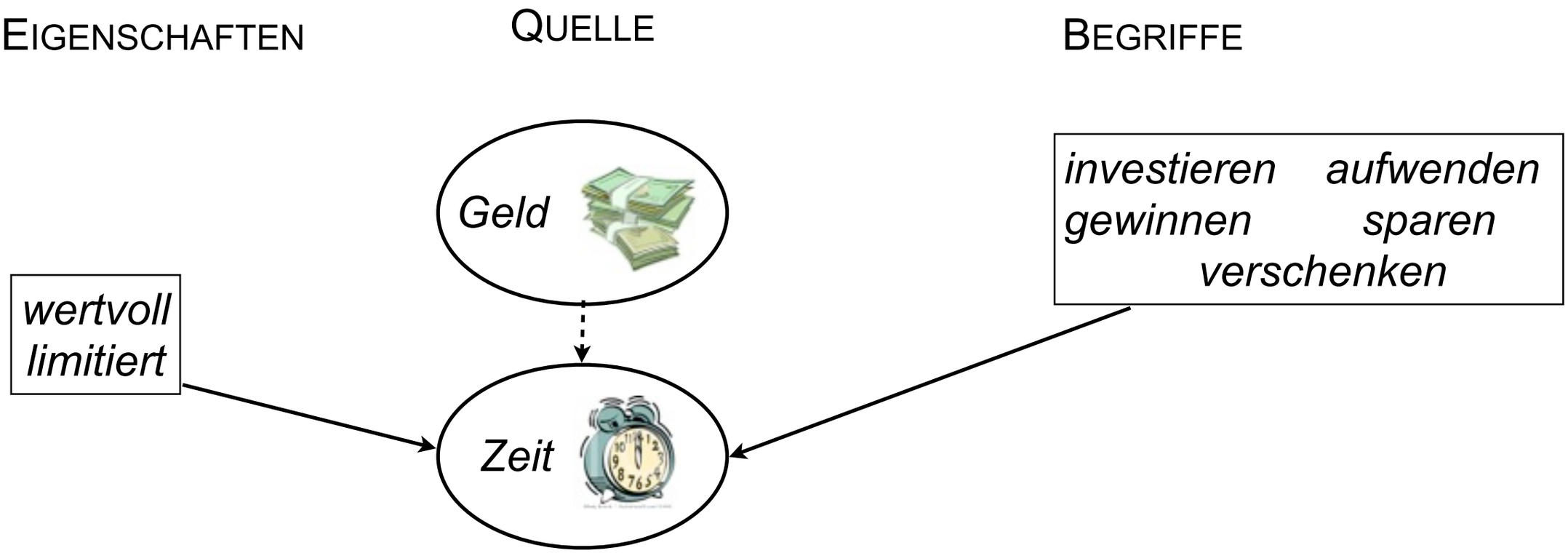

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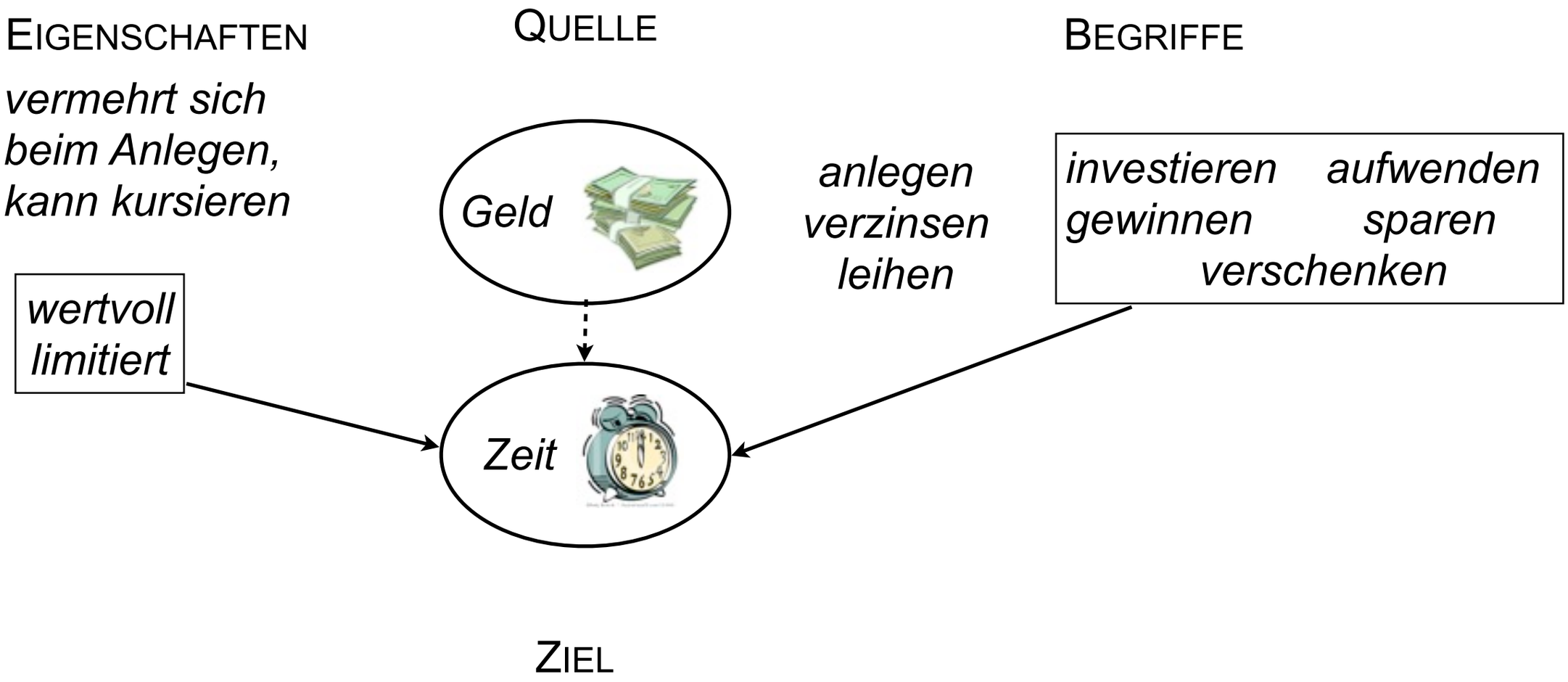

CorMet: Extraction of Concept Mappings (Mason 2004)

- Assumption: texts from a single domain (e.g. chemistry or business) contain terms either in metaphorical or literal meaning

- CorMet:
  - collect occurrences of the same verb (e.g. *ausschütten*) from different domains
  - test whether (and in which domains) the objects of verbs are meant either literally (*Säure*) or metaphorically (*Gewinn*)
  - as much as possible, generalize the terms for objects (*Säure -> Flüssigkeit*) so that as many terms as possible are combined (*Säure, Base, Lösemittel, ...*)

CorMet: Extraction of Concept Mappings (Mason 2004)

- 1: choose domains, collect documents (Internet) based on domain-typical terms (e.g. *Chemistry: oxidation, experiment, molarity*)
- 2: for each domain, extract typical verbs from the documents (*typical* = significantly more frequent than in other domains/than average)
- 3: for each verb (for a given domain) extract typical object classes // 3a: find/count objects

Chemie-Texte

Säure ausschüttet
schüttet Lösemittel aus
Lauge ausgeschüttet
Wasser ausschütten

Wirtschafts-Texte

Kapital ausschütten
schüttet Gewinn aus
Dividende ausschüttet
Zinsen ausschüttet

CorMet: Extraction of Concept Mappings (Mason 2004)

- 3b: group objects, based on some knowledge base (e.g. WordNet)

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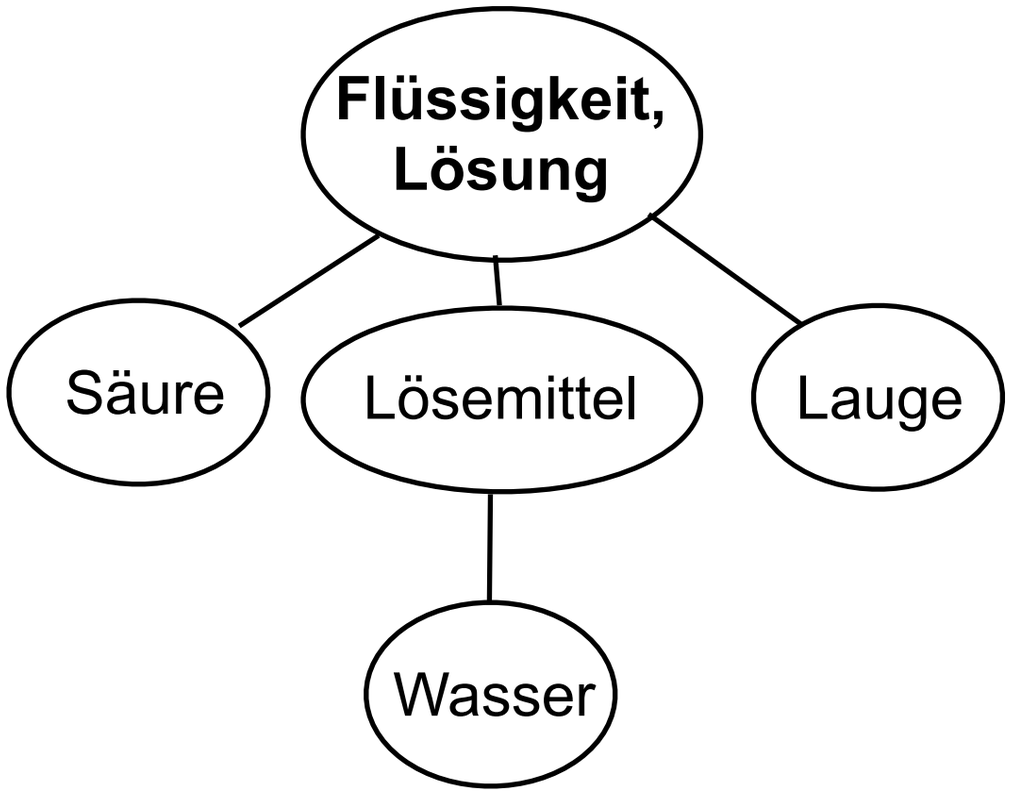
Wasser ausschütten



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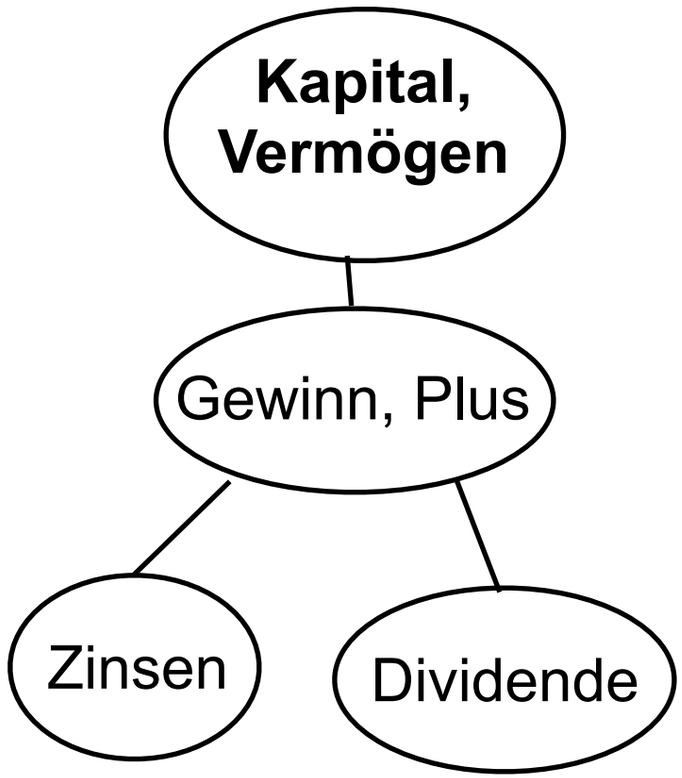

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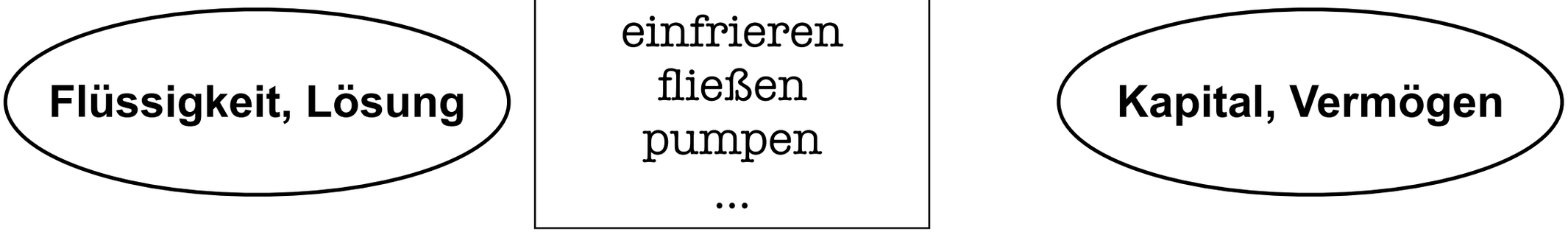
- 4: Pair up object classes when they appear as objects of several verbs in different domains



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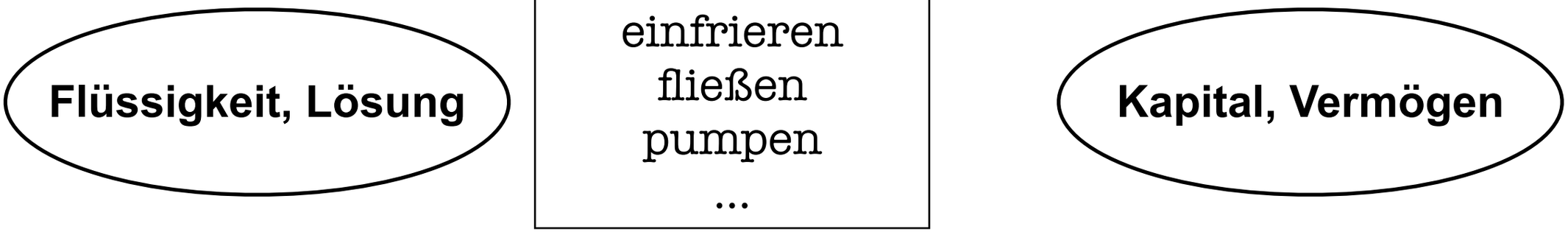

Domain "Liebe"

Domain "Militär"

CorMet: Extraction of Concept Mappings (Mason 2004)

- 5: Determine which domain is source and which is target (the source has more “extra” verbs that aren’t relevant for the target)

Emotion

verblenden
benebeln
...?

Militäreinheit

marschieren
rüsten
abziehen
kapitulieren
einfallen
bewachen
...

Übermann

übermannen
treffen
überwältigen
ergreifen
überfallen
...

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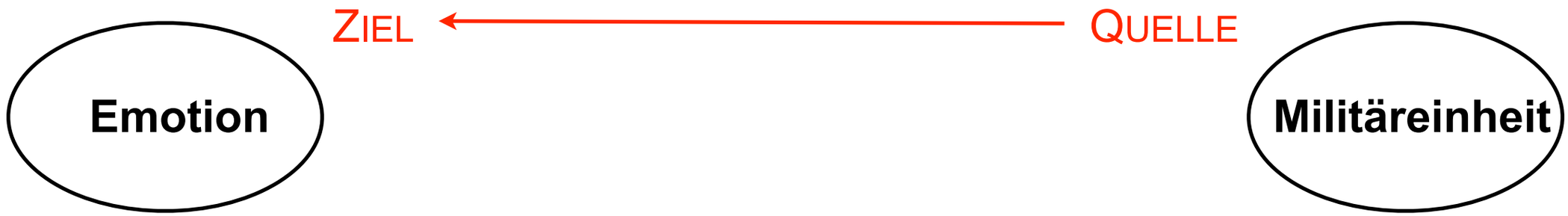

verblenden benebeln ...?	übermannen treffen überwältigen ergreifen überfallen ...	marschieren rüsten abziehen kapitulieren einfallen bewachen ...

MIDAS: New metaphors from known Concept-Mappings(Martin 1990)

User-Query in UNIX-Help:

> How can I kill a process?

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kill process : terminate process

System Output

> You can kill a process by typing ^C to the shell.

Creative Nominal Metaphors (Veale & Hao 2007)

- Problem: how to recognize metaphors with unknown concept mappings?
- New metaphors are being created all the time
- Many concept mappings are not yet as broad as, for example, *Zahlungsmittel - Flüssigkeit*

- Veale et al: use a flat, web-based approach to interpret new (i.e. creative) nominal metaphors

Creative Nominal Metaphors (Veale & Hao 2007)

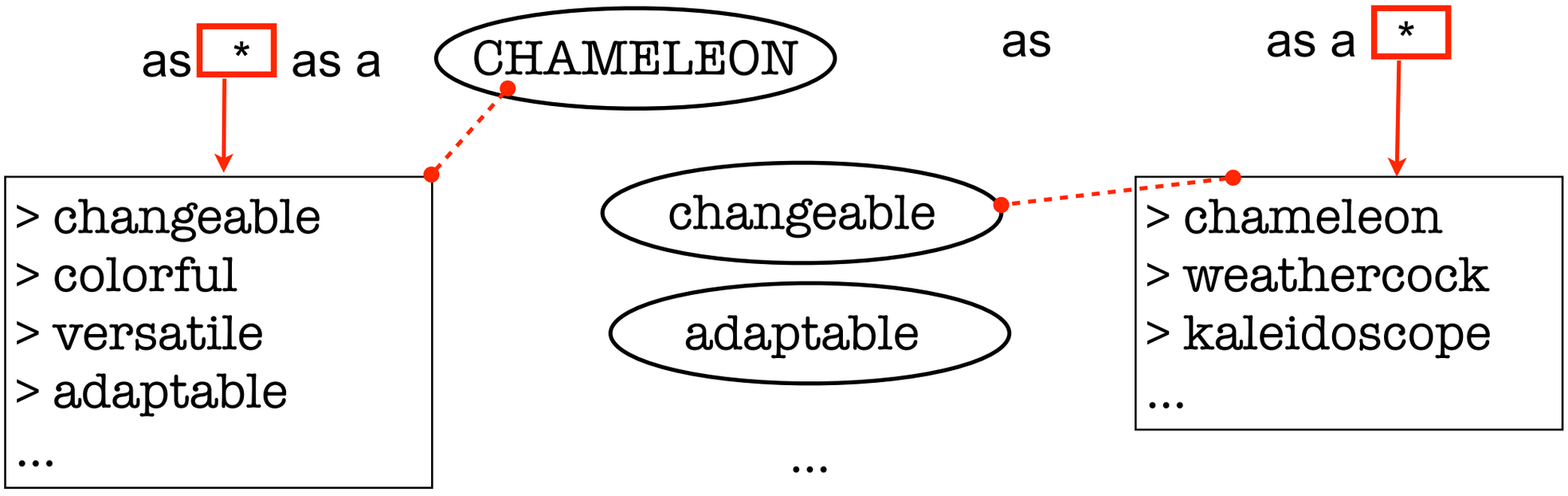
Collection of *Stereotypes*

- Collect noun and their prototypical attributes ({*Chamäleon: wandelbar, veränderlich,...}*)
- These attributes will later be the “shared” characteristics of metaphors and literal meanings
- The stereotypes/prototypes are considered to be bidirectional:
  - *wandelbar* is a prototypical attribute for *Chamäleons*
  - *Chamäleons* are prototypes of something *wandelbar*

Creative Nominal Metaphors (Veale & Hao 2007)

Collection of *Stereotypes*

- Bootstrapping: stereotypes (for English) are searched on the Web with the pattern “as ADJ as a(n) NOUN”
- Result is a lexicon with stereotypes



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Metaphor Analysis

Manche Dozenten sind Kaulquappen.

Input:
Target and
Source

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prototypical attributes of the source

Kaulquappe:

> schlängelnd
> dumm
> klein
> glitschig
> dünn
...

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GOOGLE:
“kleiner Dozent” (279)
“dummer Dozent” (46)
“dünner Dozent” (0)
“glistschiger Dozent” (0)

preferred
interpretation

Creative Nominal Metaphors (Veale & Hao 2007)

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preferred
interpretation

*“Manche Dozenten sind so **klein** wie Kaulquappen.”*

Creative Nominal Metaphors (Veale & Hao 2007)

Metaphor Generation

Schauspieler sind ...

(vielseitig)

stereotypes for the attribute

Input 1: Target
Input 2:
Focused attribute

versatile:

> chameleon
> computer
> geisha
> designer
...

check applicability

GOOGLE:
“chameleon-like actors” (131)
“designer-like actors” (0)
“computer-like actors” (1)
“geisha-like actors” (0)

preferred source

Actors are Chameleons.

Back to Chamäleon

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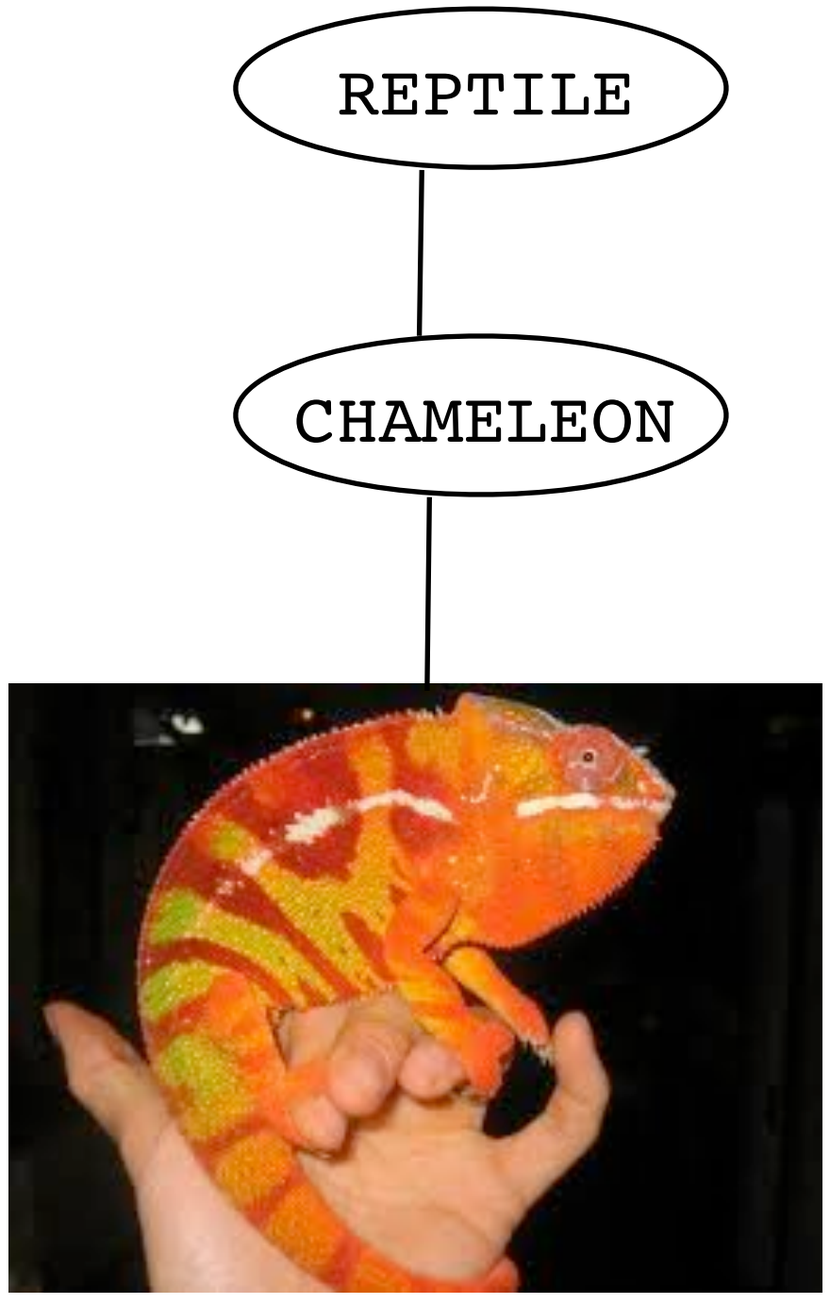

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PERSON

ACTOR

prototypical attributes:
> veränderlich
> bunt
> wandelbar
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REPTILE

CHAMELEON

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PERSON

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prototypical attributes:
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delimiting attributes:

> wandelbar
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REPTILE

CHAMELEON

Problems for Veale's Nominal Metaphors

- Proper names are initially difficult (according to Veale & Hao): Metaphors for Paris Hilton only work if
  - Paris Hilton is found sufficiently often in Google
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Robin Williams ist ein spastisches Streifenhörnchen mit Tourette-Syndrom.

Problems with Concept Mappings

- Metaphor interpretation needs a lot of world knowledge (also the interactionist theory doesn't say *how* one should find the features to be inherited)
- Lists of concept mappings are limited; creative metaphor uses can't be derived from them
- Concept mappings are not exhaustive; which metaphors work in a given concept and which don't has a complex background (language-specific reasons, historical reasons, ...)

Evaluation of Metaphor Systems

- Find concept mappings:
    - Compare with Martin's Metabank
    - Online collection of mappings from Lakoff & Johnson
- New metaphors?
- How do people produce and comprehend metaphors?
- What is a good metaphor?

New, from Twitter

- “ich bin nicht dein Fernsehen!”

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- “Du bist mein Schokoweihnachtsmann”

Summary

- Various classical theories of metaphor: Comparison theory, Interactionist theory
- Concept mappings as theory and as a basis for some computational approaches
- CorMet for extraction of new concept mappings
- MIDAS for recognizing unknown metaphors on the basis of concept mappings
- Veale's approach for nominal metaphors

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