17. LIPP-Symposium - July 6-7, 2012
Parts of Speech

Perception, experience, and the structure of event images: Modeling the emergence of Parts of Speech from cognitive processes

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1. Introductory remarks

The problem

- **Why** do languages seem to have **Parts of Speech (PoS) / Word Classes (WC)?**

Two basic positions:

In the sense of the **Via Antiqua** (à la Thomas von Aquin/Duns Scotus):

> PoS/WC are **real** and grounded in pre-linguistic or linguistic universals and are thus ‚**given by nature**'.

In the sense of a strong version of the **Via Moderna** (à la Ockham):

> PoS/WC are **nominalistic generalizations** and results from observational acts (**scientific classification**).

Cognitive Realism

- **Constructivism**: Classes of ‚objects' are constructs resulting (in all individuals) from generalizing and abstracting acts.

  ⇒ *Classes are **mental artefacts**.*

- **(Radical) Experientialism**: Classes are **self-generating** and **grounded** in memory. Memory segments are successively ‚blown up' and entrenched by processing perceived units that are construed as being related.

  => Classes are not given as such, but necessary **procedural** features of perception and experience.

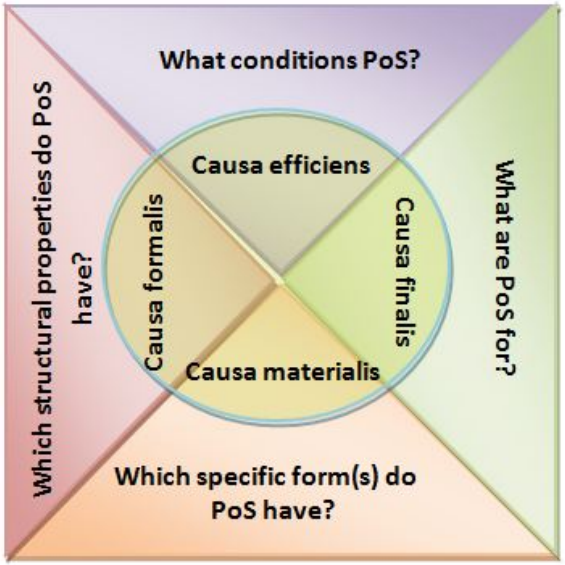
PoS and WC

- **Are Parts of Speech (PoS) and word classes the same?**
- Croft 2005: parts of speech are universal and word classes are language-specific.
- Wälchli 2008:
  - Parts of Speech = classes of word forms
  - Word Classes = classes of lexemes
- Here:
  - **PoS** refer to assumed **intrinsic properties** of a language.
  - **WC** stem from the **scientific act** of classification (meta-domain).

What ‚causes' PoS?

- The question of whether, and if yes, which PoS languages have is immediately related to the question of **why** languages do have **PoS**.

The Aristotelean CAUSA-types mapped onto PoS



Causa efficiens

- Which processes are responsible for the emergence of PoS, be it in language as such or in individual languages?

  E.g.: Croft (2005): The typology of PoS reflects patterns in conceptual space.

Options:
(1) PoS reflect properties of Universal Grammar.

(2) Minimal PoS-patterns are a ‚structural must' of languages:

Easier to process:
A+B+C+A+C+A+C+B
More difficult to process:
A+A+A+A+A+A+A+A

Causa efficiens

(3) Universals of human cognition **necessarily** condition the existence of PoS (in which gestalt so ever):

PoS are **not grounded in language**, but in **cognition** ‚as such'.

⇒ The underlying processes and concepts are turned into language features through **symbolization** just as it is true for other units of thought.

⇒ The symbolization process always results in **particularized** systems of PoS:

=> **Individual PoS are not universal**.
=> The only universals are given by the cognitive conditions that provoke PoS.

Terminology

- **Cognitive units** that underlie and condition PoS shall be called **Schematic Units of Event Images** (SUEI).

- **Parts of Speech** are linguistic instantiations of SUEIs. PoS hence are related to linguistic knowledge and linguistic practice.

Grounded Language

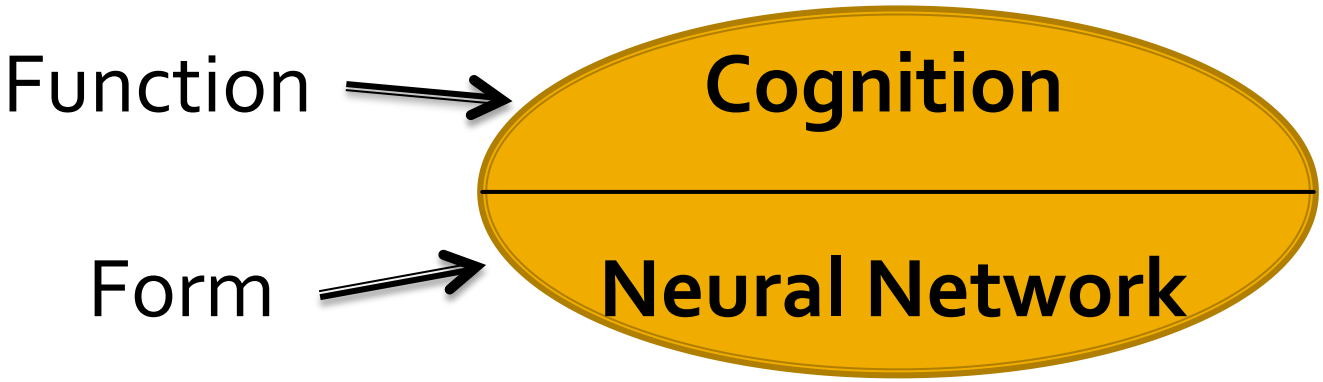
- ***Among others, language is grounded in:***
  - (a) the (**acquisition** of) **knowledge** patterns related to **linguistic practices** and entrenched in individuals that are embedded in a **social system**;
  - (b) those **cognitive processes** that motivate and control linguistic practices and that organize the corresponding knowledge system;
  - (c) the organization of **physiological** and **neural patterns/dynamics** that underlie the cognitive processes mentioned in (b).

2. Deriving Parts of Speech from Schematic Units of Event Images

2.1 Radical Experientialism

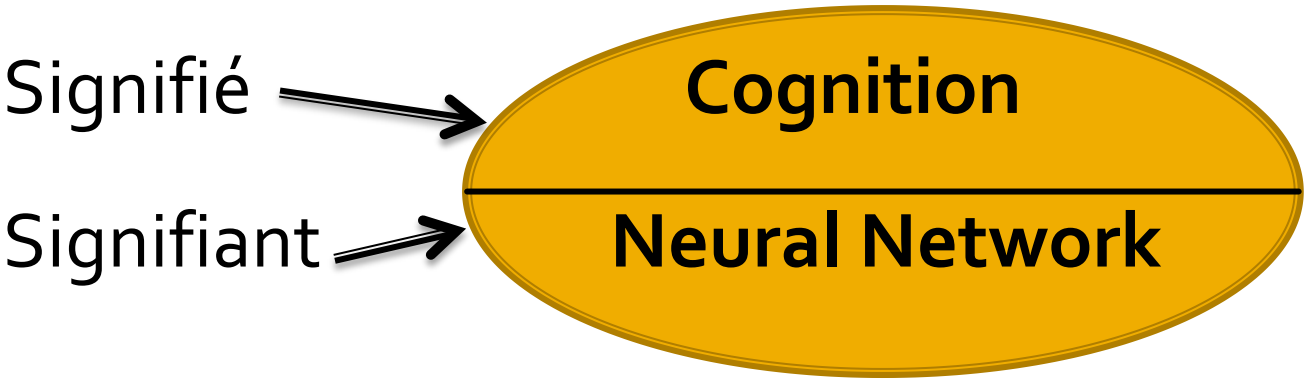
Cognition

- **Cognition** may be defined as the **functional value** of those *neural processes* that are related to the cerebrum:



The symbolic value of cognition

- The form/function pairing corresponds to that of any **semiotic** system:

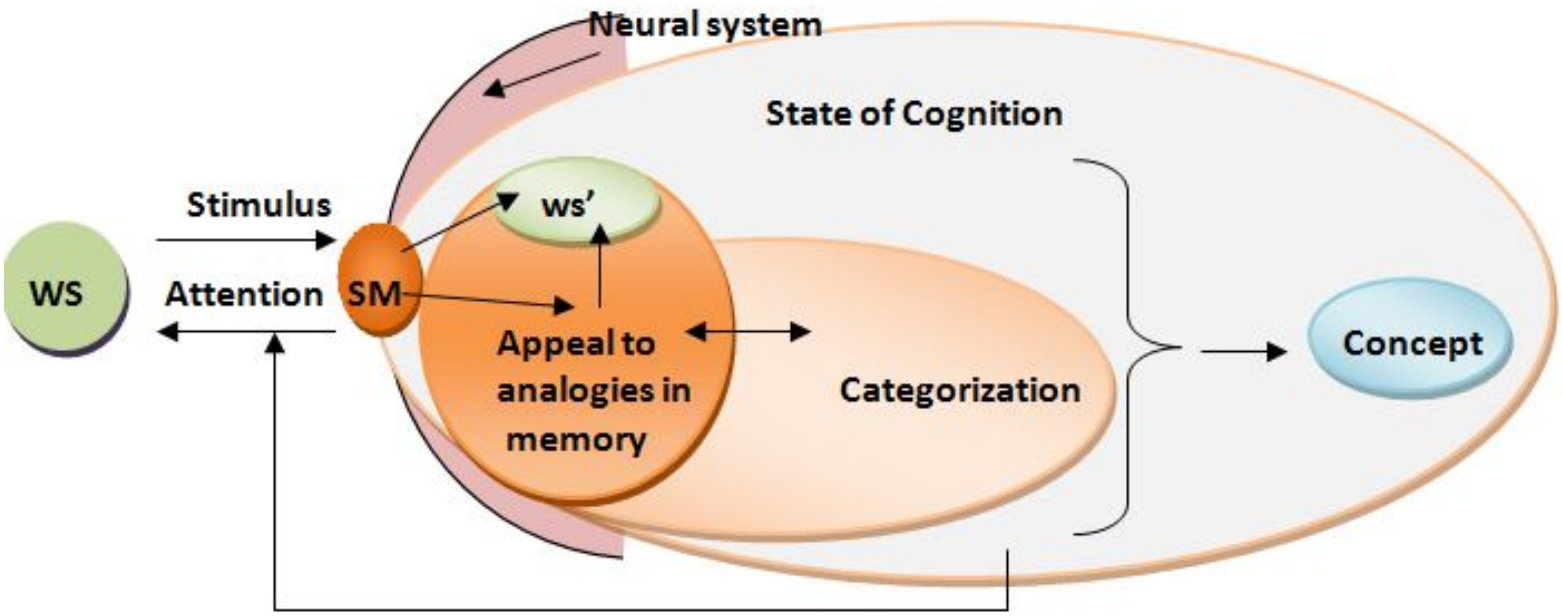


⟶ Cognitive processes have a **symbolic value**: They do not stand ‚for themselves', but are (unconsciously) ‚meaningful'.

Perception

- The **functional value** of the neural network is given as long as this network is ‚active'.
- Neural activities are dependent (among others) from the **interaction** of the system with **Outer World** entities.
- **Interaction** means that the neural system of an individual is able **to link itself functionally** to entities outside the neural network (mirroring).
- The linking **devices** are substantiated in terms of the **perceptive apparatus**.

A simplified model



- WS = World stimulus, ws' = Cognitive ‚image' of WS
- SM = sensomotoric device

Perception and Construction

- Cognition does **not** process Outer World entities (world/environmental stimuli) **as such.**

Rather:

- Cognition construes ‚**images**' of a WS (ws') in accordance with its ‚states'.
  - Memory and encyclopedic knowledge, situational/episodic/experiential knowledge, emotive state, ‚informative state' of cognition etc.

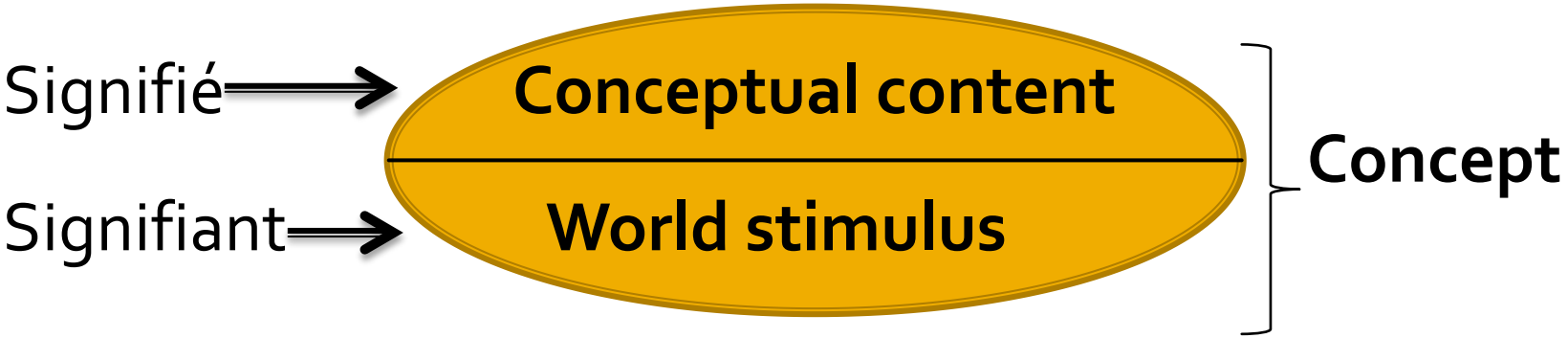
A **construction** is additionally structured by **primary** (pre-cognitive) **schemas** of perception (schemas of vision etc.).

Concepts

- **Conceptualization:** The image of a WS is always construed in qualitative analogy with a set of stored images.
- The resulting concept can be described as the **experientially entrenched** and **generalized model** embodied in the individual ‚members' of the set.
- Accordingly, concepts do **not** represent objects or events in the world, but **cognitve constructions** grounded in the experience of such objects or events.

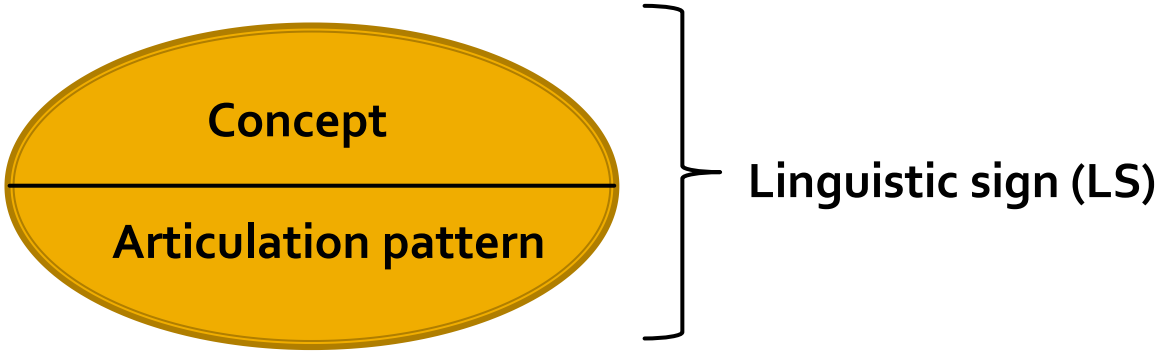
The symbolic value of concepts

- **Concepts** are **symbolic** in nature: A World Stimulus (be it real or fictive) can be regarded as a signifiant the signifié of which is the conceptual ‚content‘:



Linguistic signs

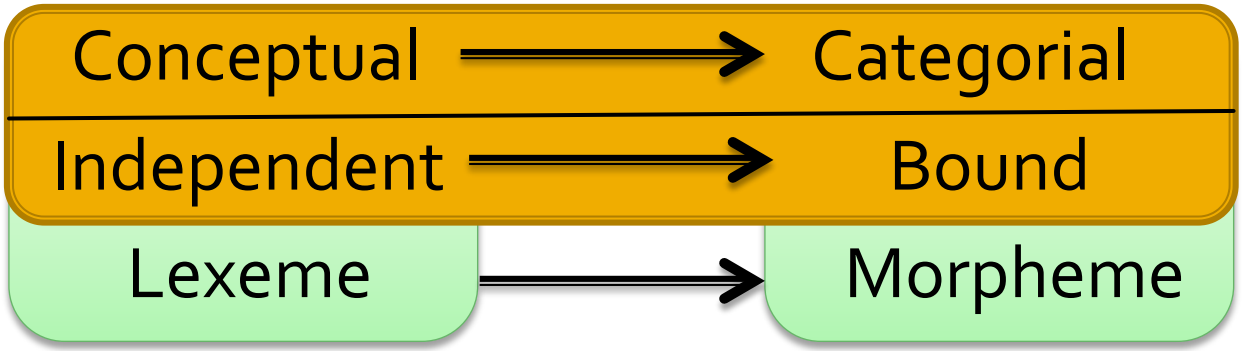
- **Linguistic signs** results from the (learned) coupling of articulation (or: expression) patterns with a conceptual unit.



Linguistic signs can be ‚**substantial**' (marked for a distinct articulation pattern), **structural** (marked for mere positional patterns that are filled by other linguistic signs), or both.

Substantial linguistic signs

- Underived substantial linguistic signs are located on a continuum with respect to both the formal and the conceptual dimension:



Structural linguistic signs

- The signifié of **structural** linguistic signs normally encodes **schema-concepts** such as Cause-Effect schemas, meronymic schemas etc.

- They may also result (among others) from the conceptualization of properties of linearity and attention/information flow.

2. Deriving Parts of Speech from Schematic Units of Event Images

2.2 Schematic Units of Event Images

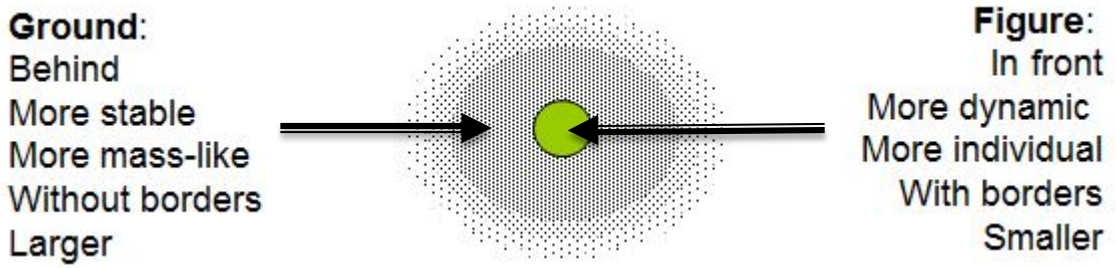
Event Images

- Human beings construe World stimuli in terms of **Event Images**.
  - Note: *Event* includes both processes and states.
  - Note: World stimuli can be both real (mediated through the sensoric apparatus) and fictive (memory stimulus).

The **perception** of a World Stimulus is schematized according the physiology of the sensoric apparatus.

Event Images as relational schemas

- "Any excitation in the nervous system has the character of **a figure/ground process.** Any performance invariably shows this figure/ground character (…). Figure and background can be discriminated as readily in speaking, thinking, feeling, etc." (Kurt Goldstein)
- Goldstein, Kurt (1940[1963]): *Human nature in the light of psychopathology.* New York: Schocken Books,12-13)



- The Ground-domain can be masked, whereas the Figure-domain must always be expressed.

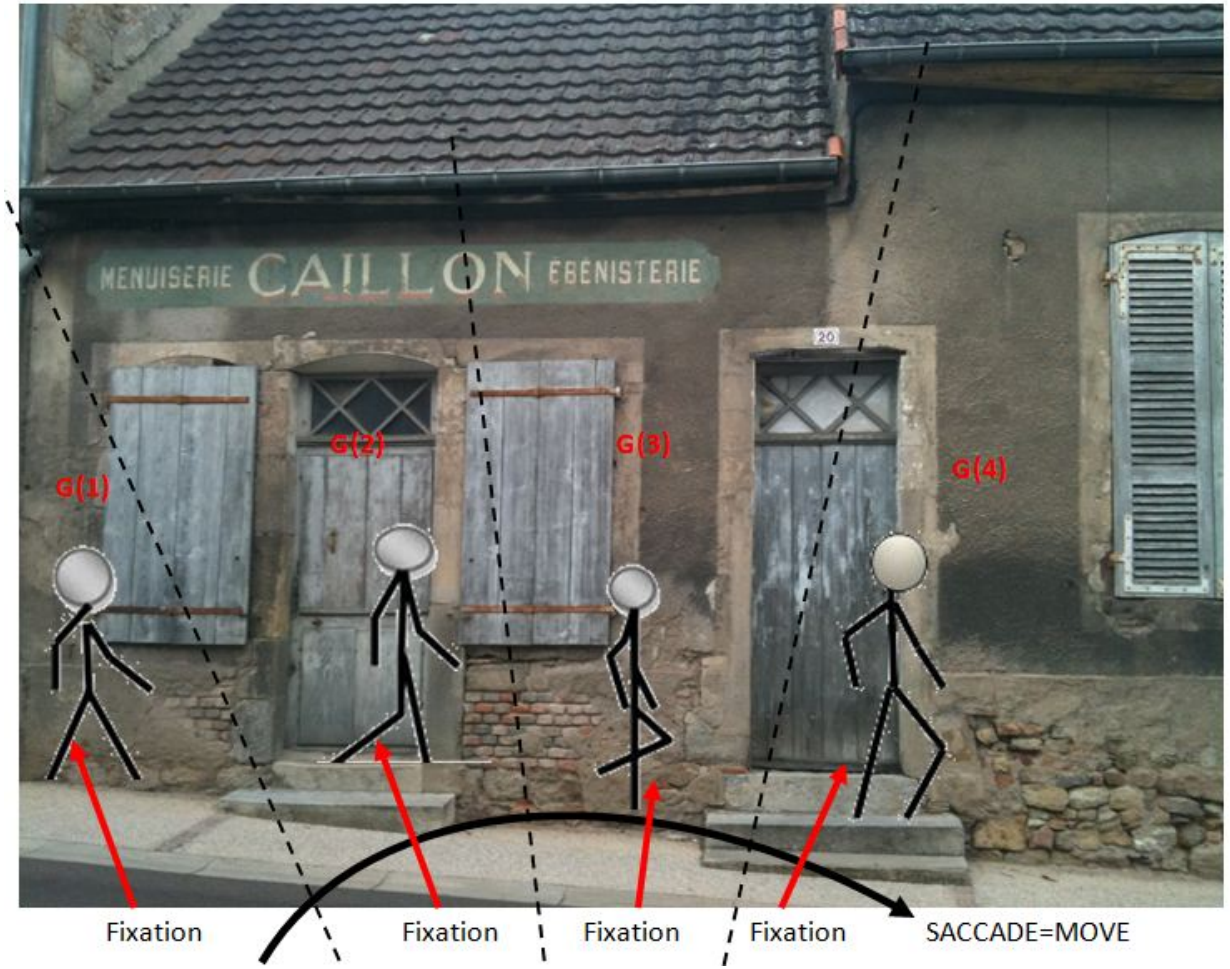
Event Images as relational schemas

- The isolation of Figure and Ground presupposes a construction of the corresponding unit based on perception [here: **vision**].

- Cognitive Fixation:
  - Basis: The stable position of the eyes allows to isolate Figure and Ground.
    - **Consequence**: Fixations allow mapping the input onto given memory segments.

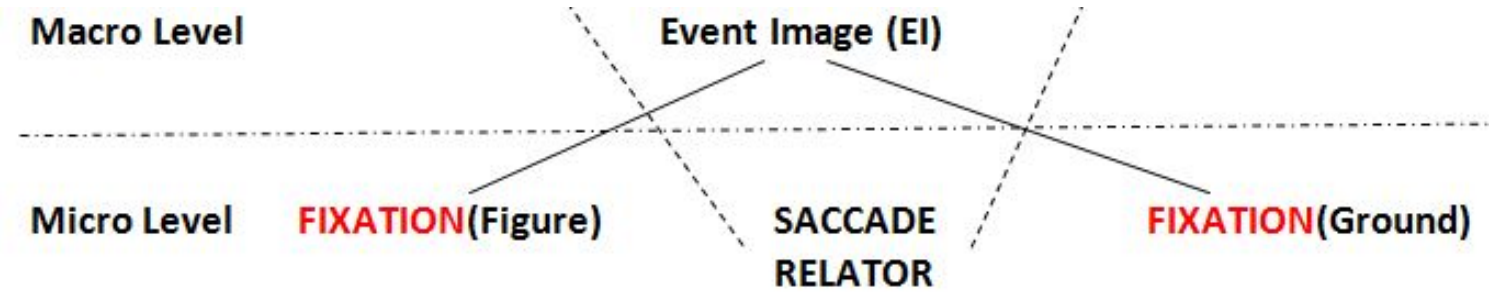
- Cognitive Saccade:
  - Basis: During eye movement, the visual input becomes blurred (or ‚blind').
    - **Concequence**: The relational structure between Figure and Ground must be inferred (among others) from properties of Figure and Ground.

Fixation and Saccade



Relations

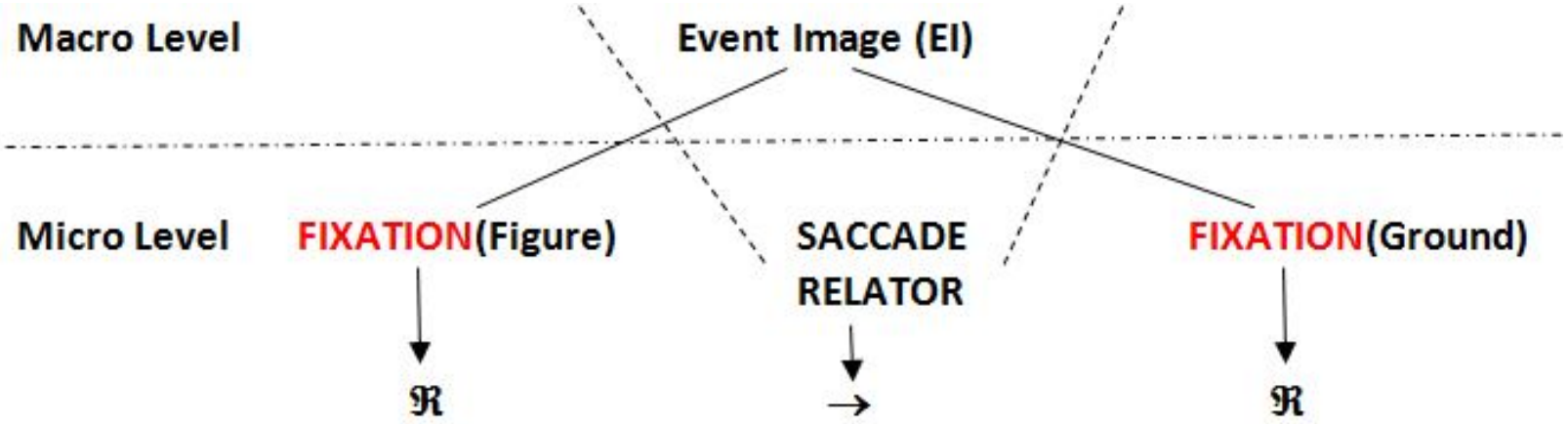
- Event images are schematized according to a relational schema that links two (or more) **fixation** units with a relator.
- The relator is always a **cognitive saccade** and thus inferred from the properties of the fixation units.



Reference and Relator

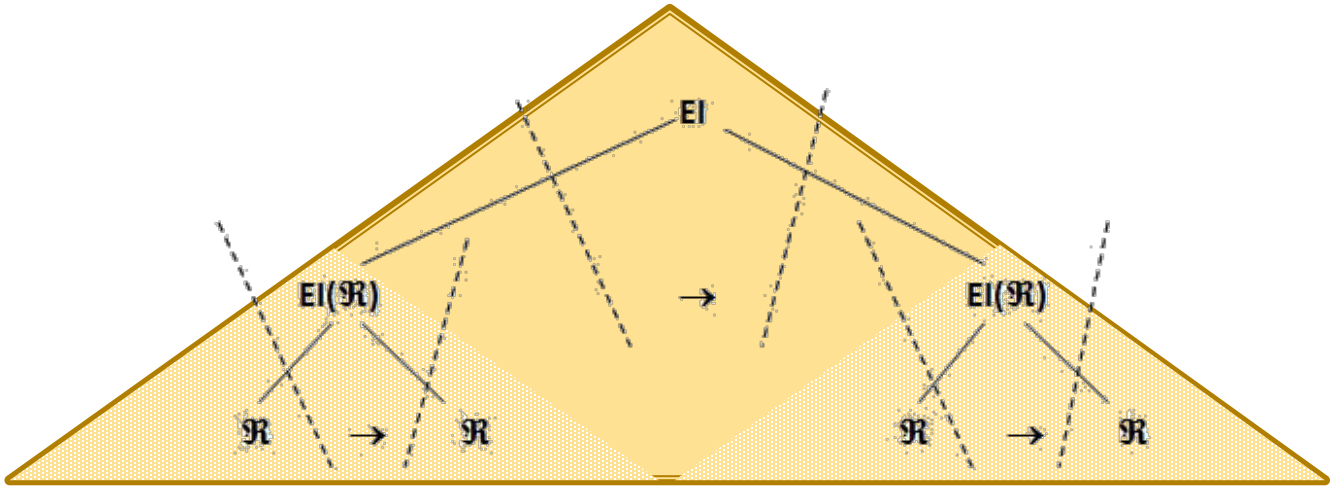
- The fixation units establish the most salient Schematic Unit of Event Images:
  - Repeated fixation of the ‚same' (or ‚similar') input unit conditions the gradual entrenchment of the corresponding object image in terms of Object Permance.
    - **Consequence**: Concepts are categorized as **‚referents' ($\mathfrak{R}$)**
  - Repeated relational constructions between two referents condition the gradual entrenchment of the corresponding saccade.
    - **Consequence:** Saccades are construed as (meronymic) concepts representing the relational property of event images. These concepts are categorized as **‚relators' ($\rightarrow$).**

The basic schema of event Images



Fractal properties of complex Event Images

- When two (or more) Event Images are perceived in a sequence, the individual EIs are construed as **complex referential units** that are again linked together by a **relator**. The resulting structure is **fractal-like**:



Qualification

- **Referents** may be likewise embedded into relational structures that relate the referent to another domain in terms of **qualification**:
- 

Conceptual Deixis ?

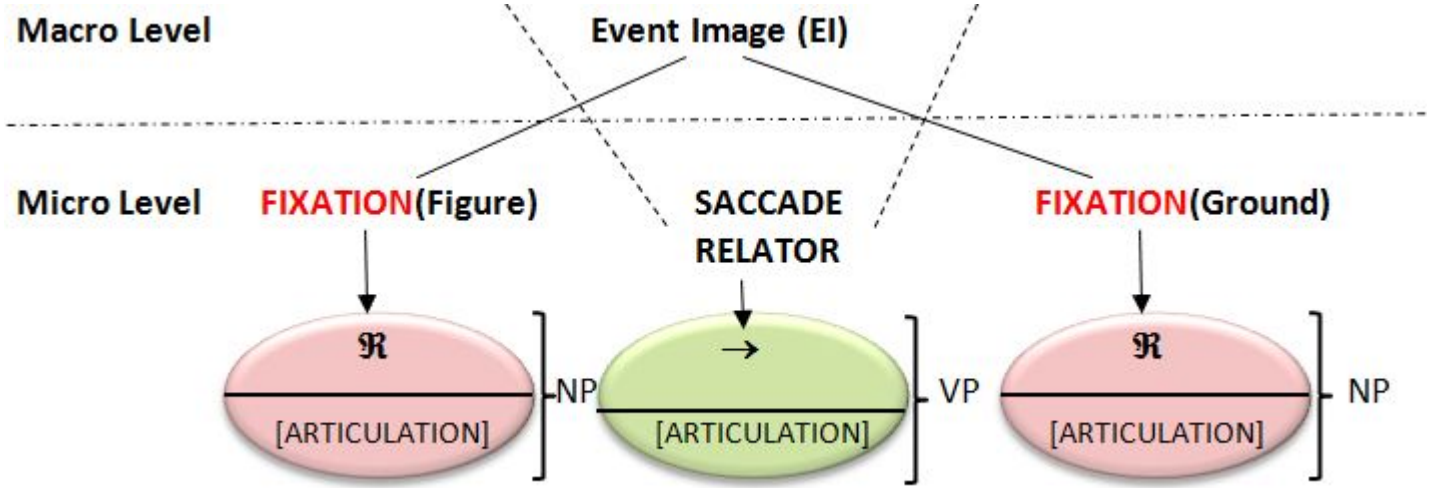
- Event Images are thus necessarily marked for two basic schematic units:
  - **Referent ($\mathfrak{R}$)**
    - **[~ THINGS à la Langacker; MATTER à la Talmy etc.]**
  - **Relator ($\rightarrow$)**
    - **[~ RELATION à la Langacker; ACTION à la Talmy etc.]**

It remains an open question, whether **deictic processes** are grounded in conceptual units. Language data suggest that deictic concepts are a space/time-oriented **subtype of referential units** (e.g. use of deictic elements for referentialization).

PoS as linguistic symbols of SUEI

- The most immediate symbolization of Schematic Units of Event Images is that of ‚co-behavior' (paradigmatic):
  - It can be assumed that every language has at least minimal devices to distinguish **referential symbols** from **relational symbols**.
  - E.g.:
    - **Configuration** (positional constraints)
    - **Overt encoding** of referentiality or relationality
    - **Intrinsic categorization**: Linguistic signs are processed as being referential or relational because of their conceptual value (signifié).

The linguistic symbolization of Event Images



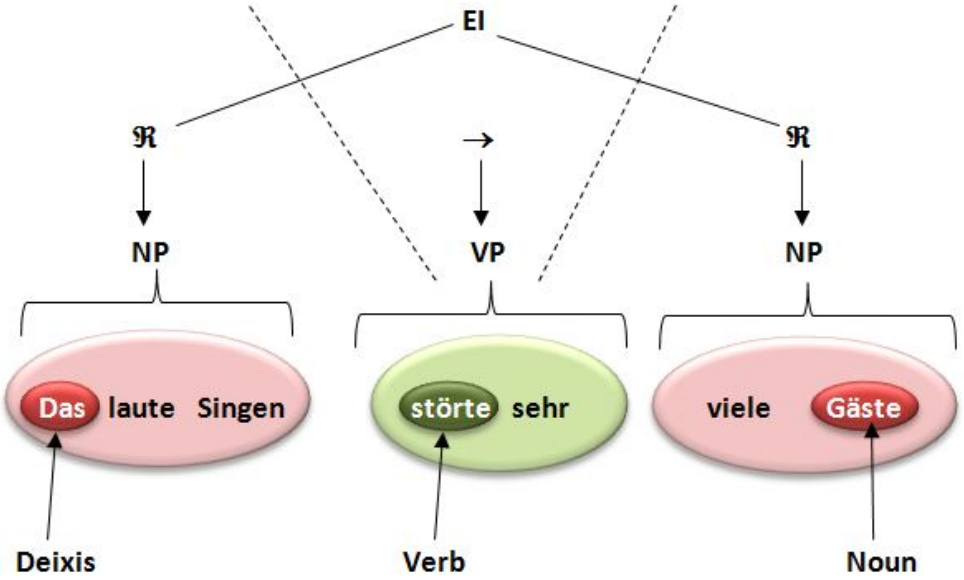
the woman saw the dog

Noun Phrase and Verb Phrase

- Every linguistic symbolization of an Event Image includes at least a **referential unit** (expressed interms of an **NP**) and a **relational unit** (expressed in terms of a **VP**).
  - NP and VP are the immediate **linguistic signs** for the **givenness** of a referent and a relator.
    - When chaining Event Images, the expression of a subsequent (co-)referent or (co-)relator can be suppressed (inferred).
    - The same holds if the referent of the relator is ‚understood' from scripts, frames, or encyclopedic/conventional knowledge.

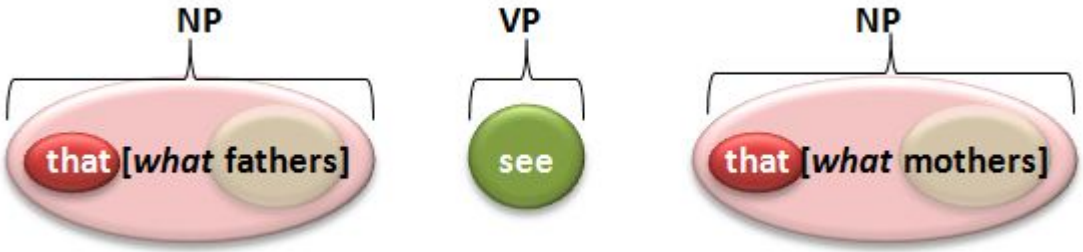
NP- and VP-Profiling

- Any NP or VP is marked for a segment that represents the referential ‚peak' (NP) or relational ‚peak' (VP):

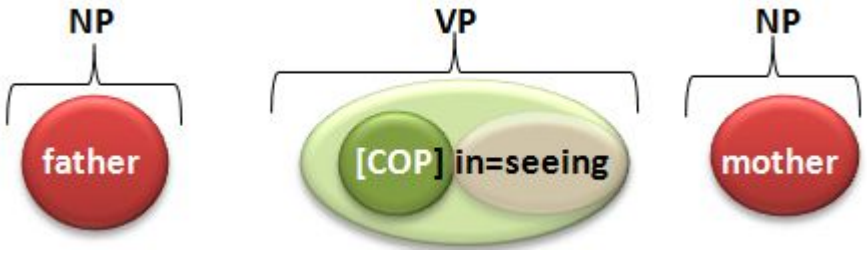


Nouniness and Verbiness

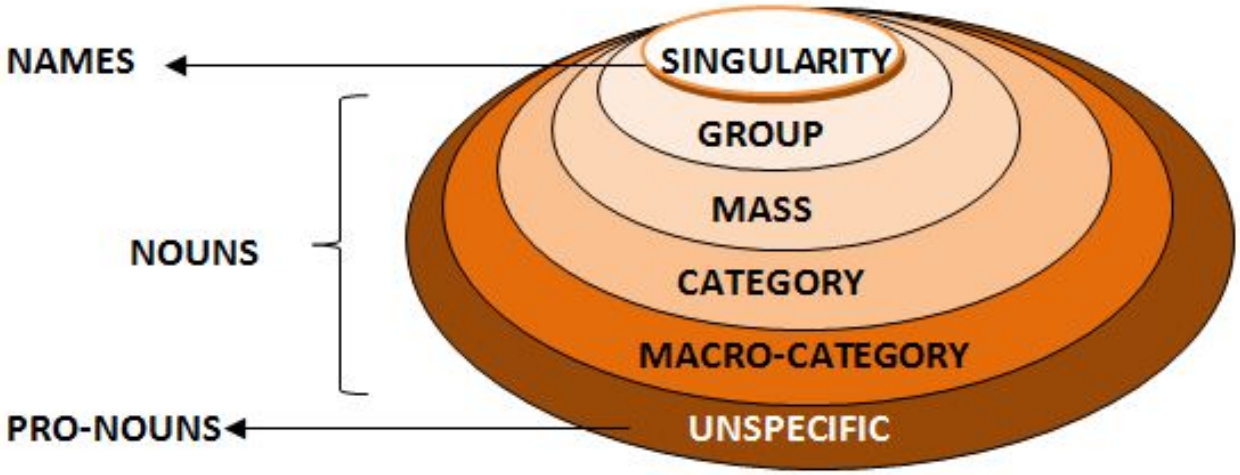
- Weak nouniness/strong verbiness:



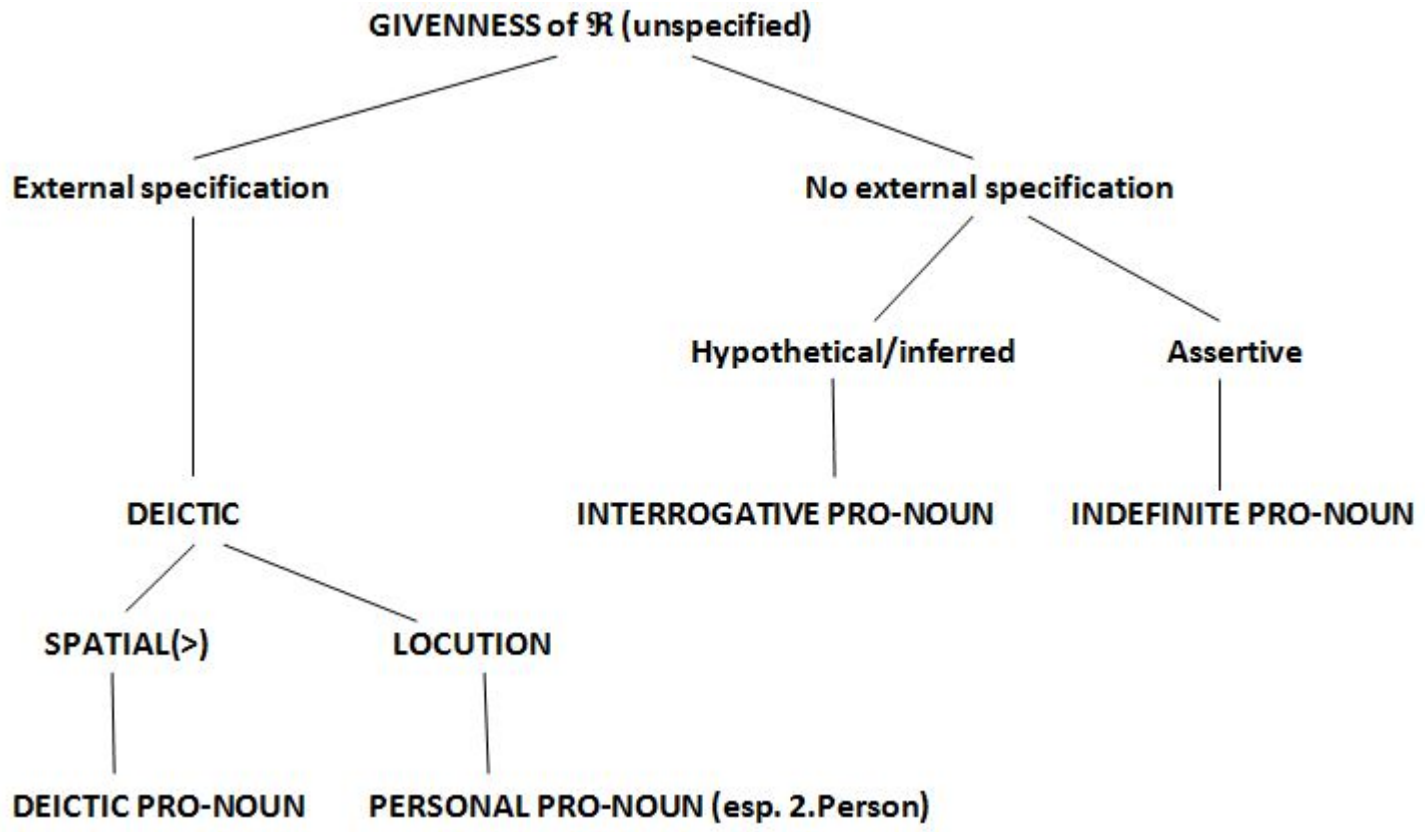
Weak verbiness/strong nouniness:



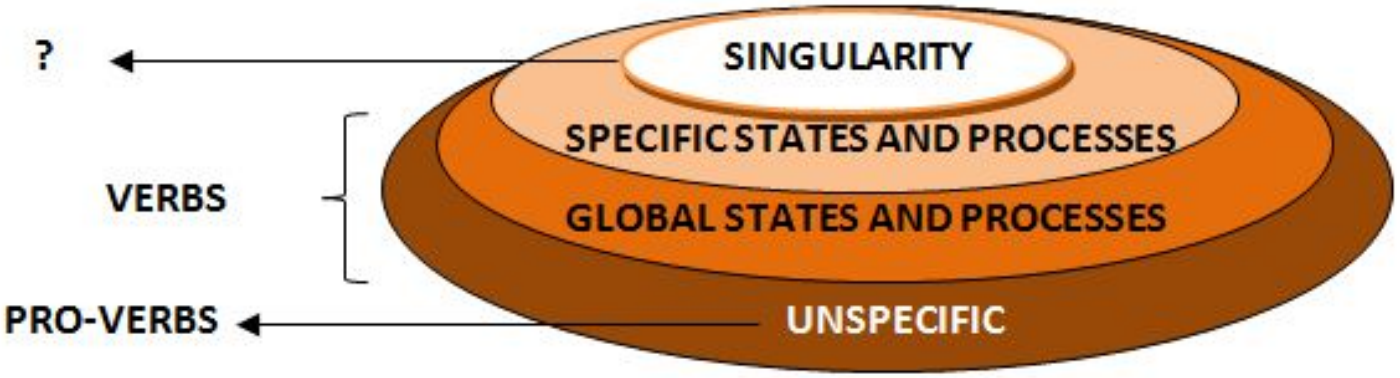
The grading of referential specification



Subcategorizating unspecific referentiality (basics)



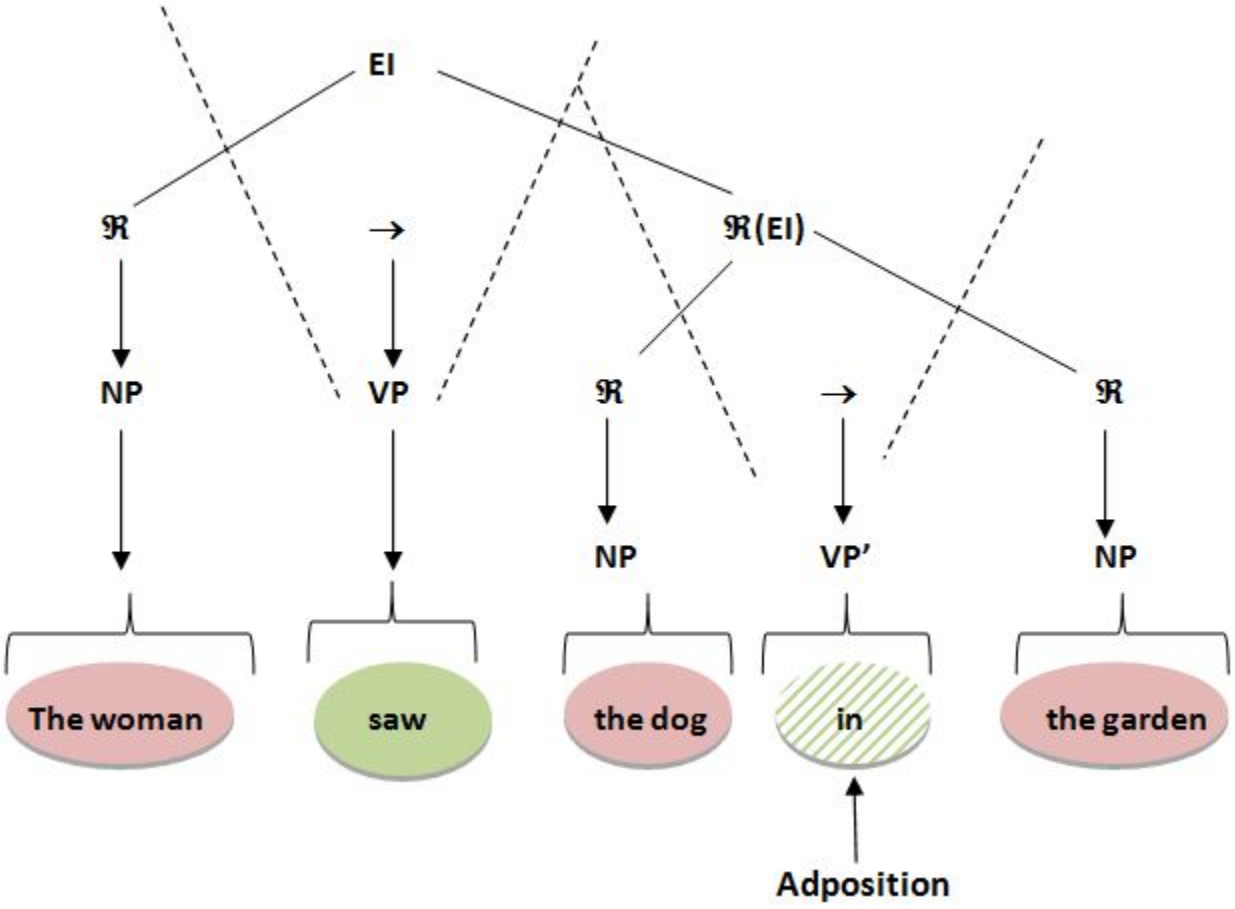
The grading of relational specification



Verboid relators (1)

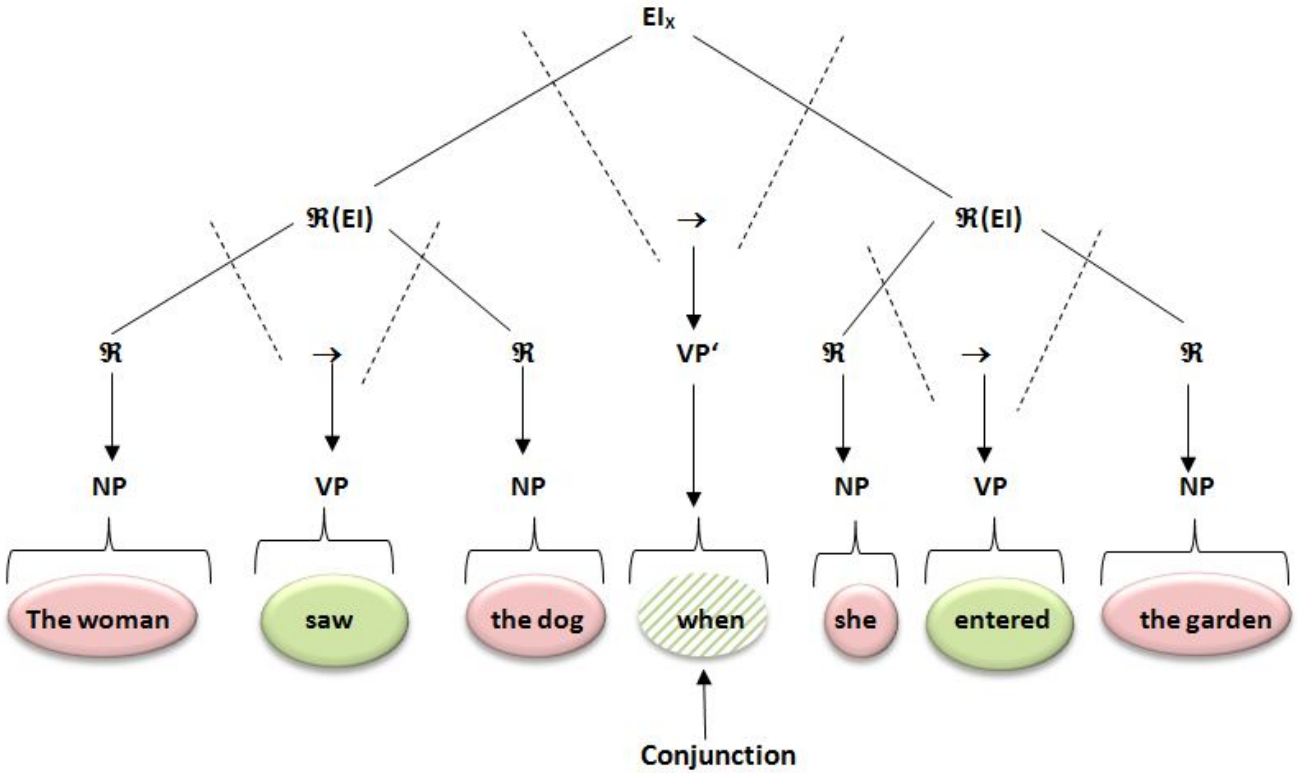
- Verboid relators are linguistic signs that do not function as meronymic expressions of simple Event Images and thus lack features typical for the linking of such Event Images to states of knowledge, for instance:
  - Memory appeal > PAST
  - Perception appeal > PRESENT
  - Experiential projection > FUTURE
  - Degrees of givenness in experience (MODALITY) ***etc.***
- Verboid relators typically link two units in terms of locational semantics:

Verboid relators (2)



Verboid relators (3)

- ‚Macro-relators' link two Event Images:

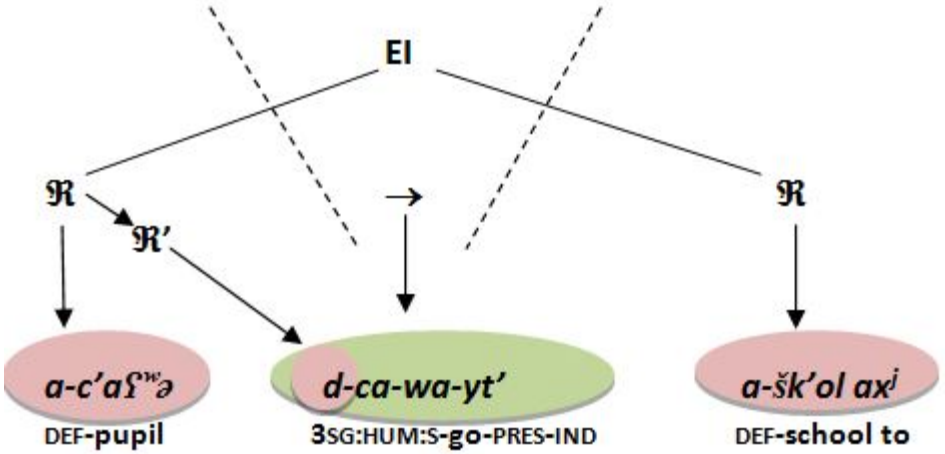


Secondary Referents

Projecting (echoing) categorial properties of referents

- Referential expressions can be mapped onto relational expressions in order to establish a stronger (functional) linkage between the two units (head marking).
- Most typically, such ‚echoes' show up as **‚verbal agreement'**:

- Abkhaz
  - (word order harmonized)



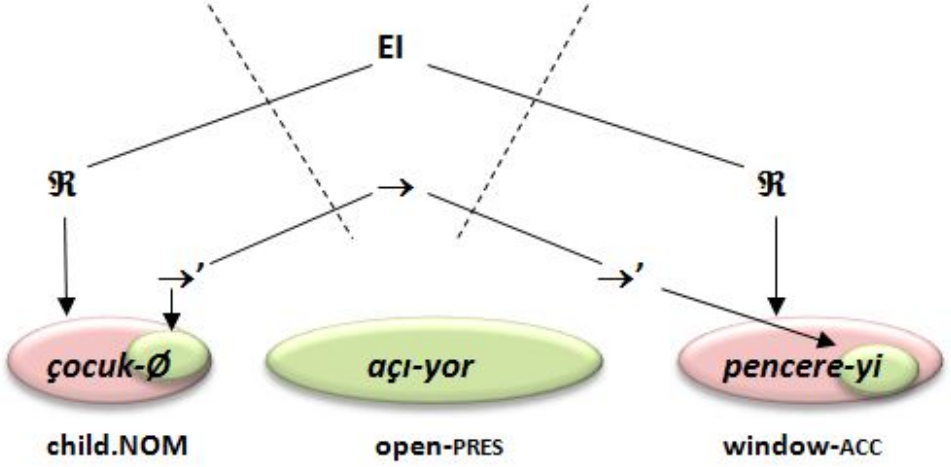
'The pupil goes to (the) school'

Secondary Relators

Projecting (echoing) categorial properties of relators

- The schematic value of relational expressions can be mapped onto referential expressions in order to establish a stronger (functional) linkage between the units (dependent marking).
- Most typically, such ‚echoes' show up as **‚nominal case'** (morphemes, lexcial forms, position etc.):

- Turkish:
  - (word order harmonized)



'The child opens the window.'

Where are the Adjectives?

- **Adjectives** do **not** reflect a basic Schematic Unit of Event Images.

X [who] BE [IN REDNESS]	$F \rightarrow G$	
=> X BE=RED(NESS)	$F \rightarrow_{/G}$	*Incorporation*
=> X RED	$F_{/G}$	*Qualification*

Or:

X IN=REDNESS=BEING=ONE	$F; [F \rightarrow G]_{\Re}$	*Apposition*
=> X RED=BEING=ONE	$F; [(F) \rightarrow G]_{\Re}$	
=> X RED=ONE	$F; G_{\Re}$	

Attributive Adjectives

- **Conceptual ‚Relative Structure' [Formula: $\mathfrak{R}_{\rightarrow}$]:**
-
- Udi: *śawat'* *beli*
- beautiful animal
- 'the beautiful animal' < *'the beautiful-BEING animal'

- **Appositional [Formula: $[\mathfrak{R}+\mathfrak{R}]_{\mathfrak{R}}$]:**
-
- Arabic: *al-ḥayawān-u* *'l-jamīl-u*
- DEF-animal-NOM DEF-beautiful-NOM
- 'the beautiful animal' < *'The animal, the beautiful one'

Predicative Adjectives

(a) X BE IN-Y
X BE=$Y_{/ADV}$

(b) X BE [IN-Y-BEING]-ONE
X BE Y-BEING-ONE
X BE $Y_{/ONE}$

Compare:

(a) Udi *yoldaš* *śawat‘-t‘e*
friend nice-(BE).3SG

(b) Latin: *amicus* *bonus* *est*
friend nice.ONE be.PRES.3Sg

Summary of SUEI-grounded PoS

- Subcategorization of PoS resulting from Schematic Units of Event Images

	REFERENTIAL DOMAIN	RELATIONAL DOMAIN
SINGULARITY	NAME	?
SPECIFIC ELEMENT OF SET	SINGULAR OBJECT NOUN	VERB
SPECIFIC SET/CATEGORY	SET NOUN	
UNSPECIFIC	PRO-NOUN	PRO-VERB
GENERAL	NOMINALISER	VERBALISER
REDUCED	POSTPOSITION	PREPOSITION CONJUNCTION
ECHOES	VERBAL AGREEMENT	NOMINAL CASE
SPECIFYING $\mathfrak{R}$	ADJECTIVE (1)	ADJECTIVE (2)
SPECIFYING $\rightarrow$		ADVERB