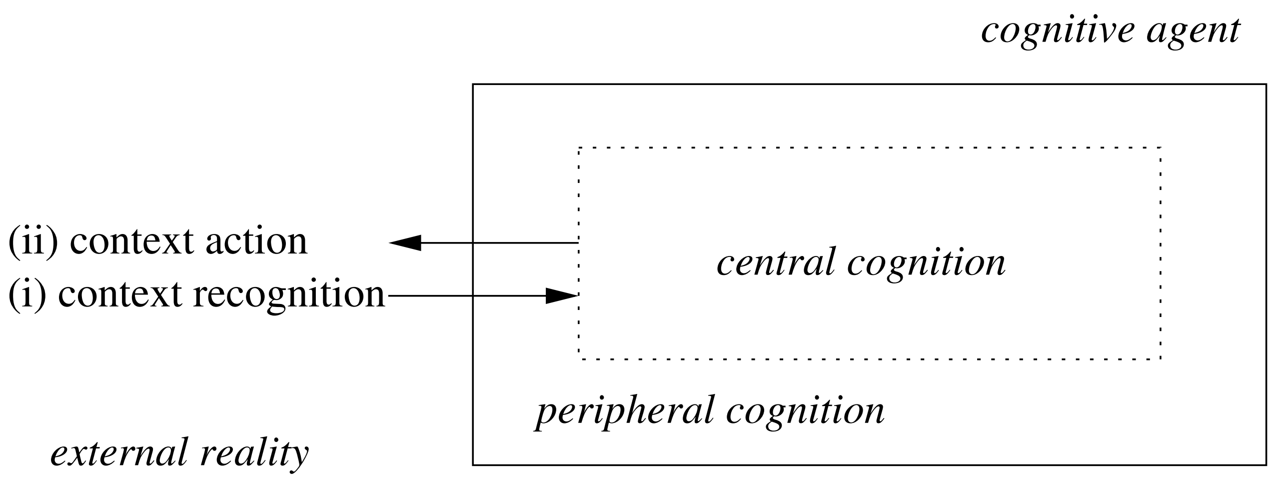
2. Interfaces and Components

2.1 Cognitive Agents with and without Language

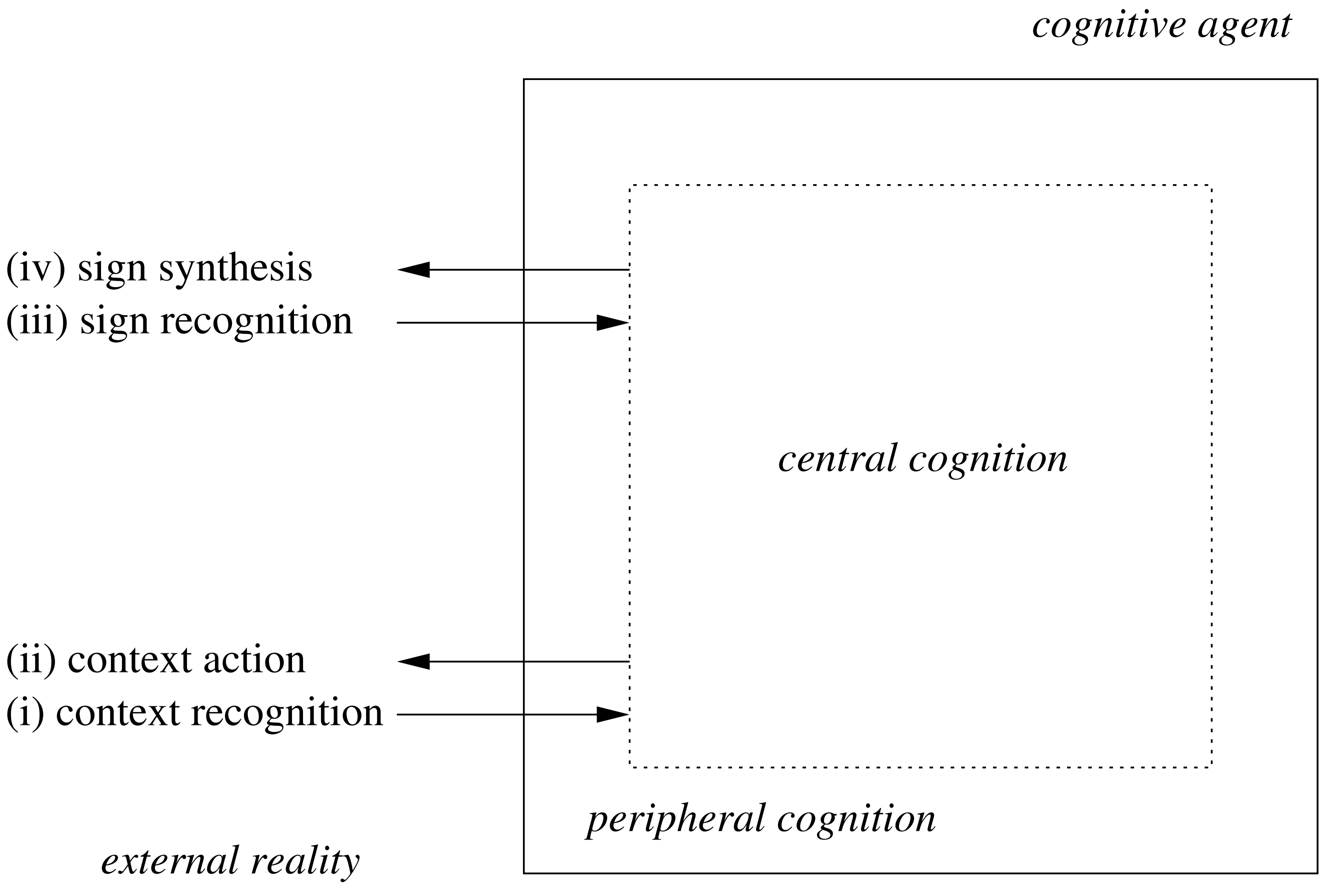
2.1.1 Support for building the context component first

1. Constructs from the context-level may be re-used at the language level. This holds for (i) the concepts, as types and as token, (ii) the external interfaces for input and output, (iii) the data structure, (iv) the algorithm, and (v) the inferences.
2. The context is universal – in the sense of being independent of a particular language, yet all the different languages may be interpreted relative to the same kind of context component.
3. In phylogeny (evolution) and ontogeny (child development) the context component comes first.

2.1.2 External interfaces of a cognitive agent without language

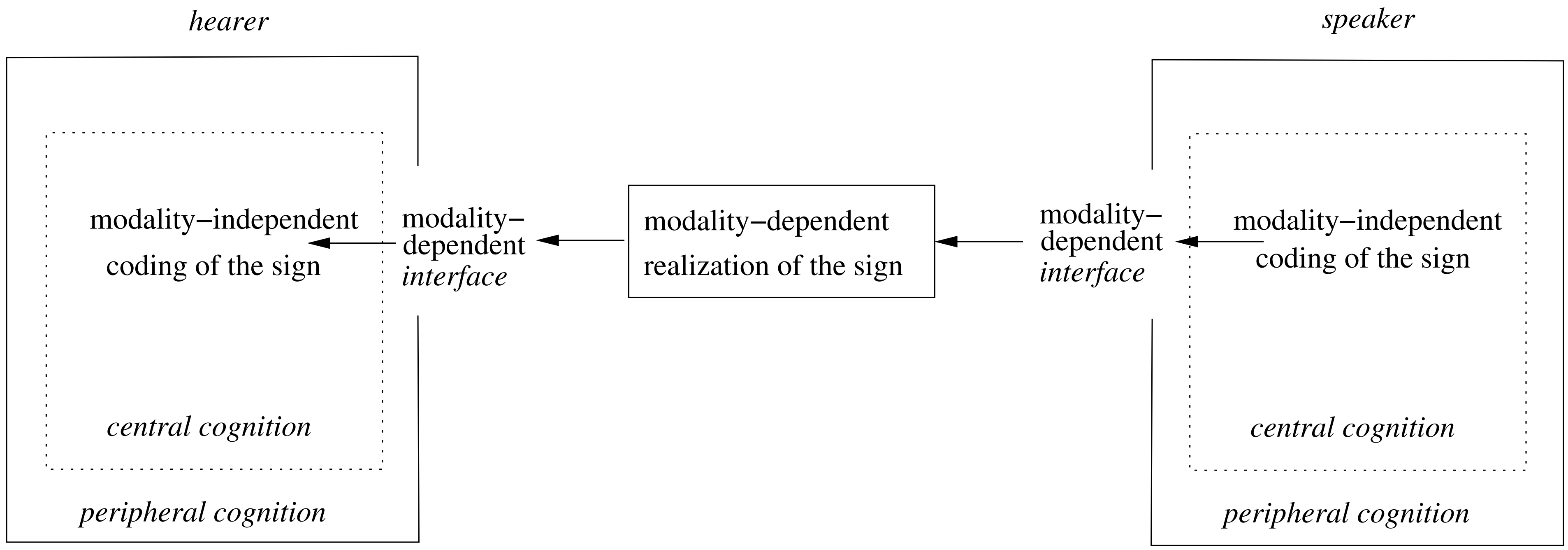


2.1.3 External Interfaces of a cognitive agent with language



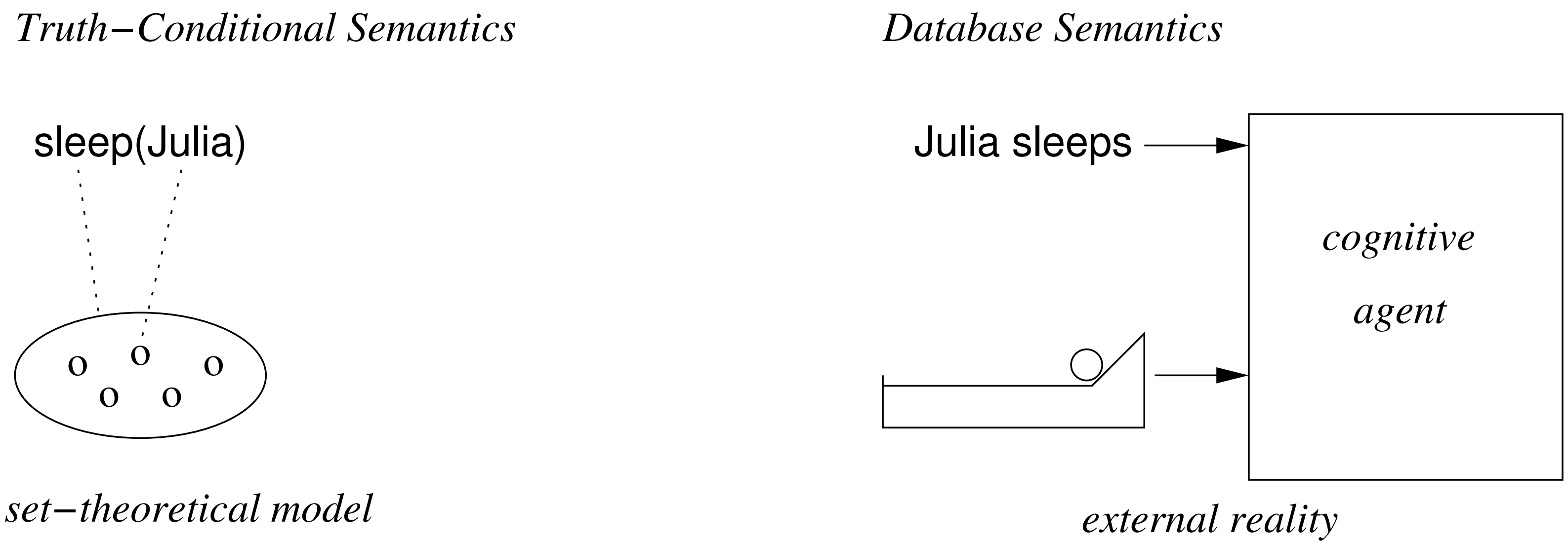
2.2 Modalities and Media

2.2.1 Modality-independent and modality-dependent coding



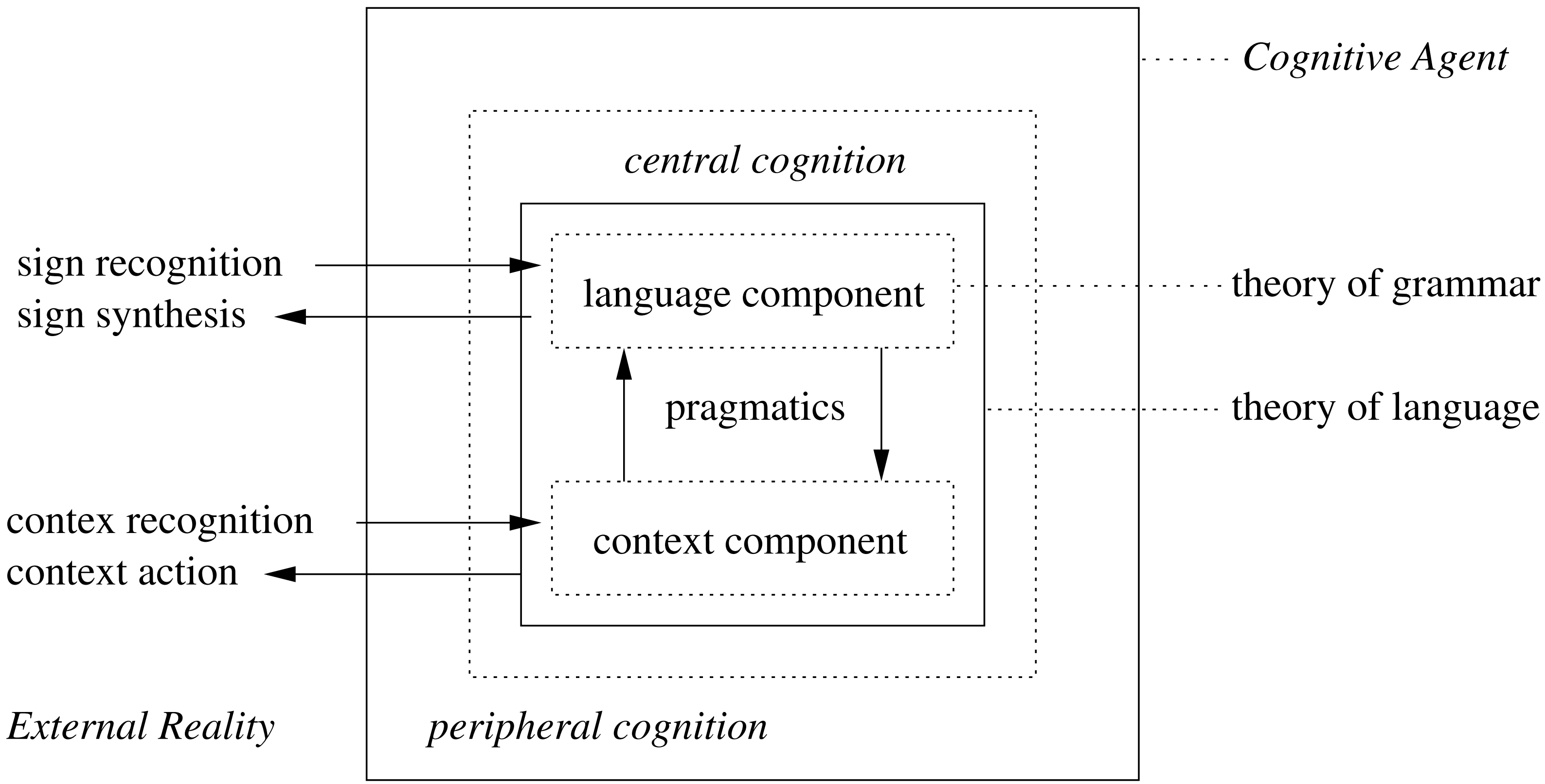
2.3 Alternative Ontologies for Referring with Language

2.3.1 Reference in alternative ontologies



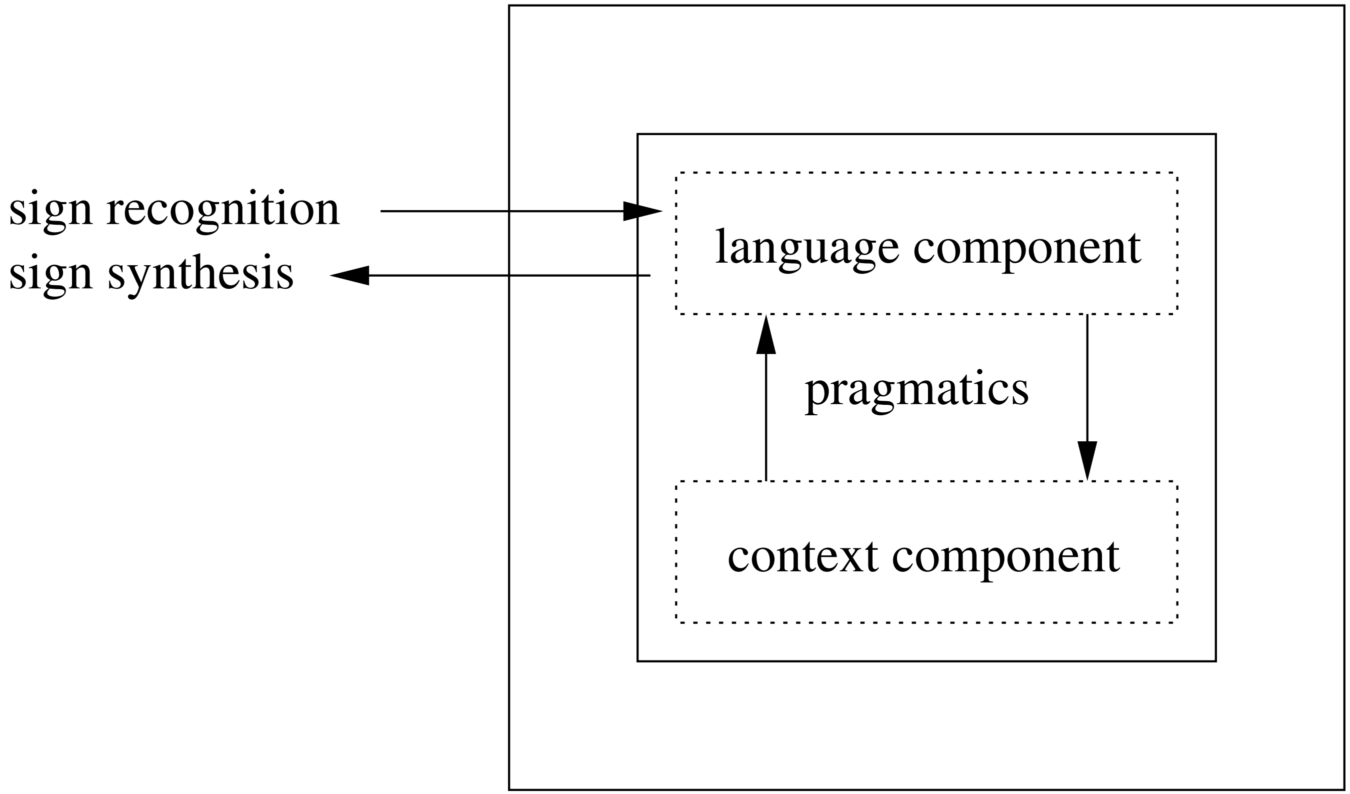
2.4 Theory of Language and Theory of Grammar

2.4.1 Structuring central cognition in agents with language



2.5 Immediate Reference and Mediated Reference

2.5.1 USE OF EXTERNAL INTERFACES IN MEDIATED REFERENCE



2.5.2 Disadvantages of not having contextual interfaces

1. *The conceptual core of language meanings remains undefined.*
   Most basic concepts originate in agents without language as recognition and action procedures of their contextual interfaces, and are re-used as the core of language meanings in agents with language.Therefore, agents with language but without contextual interfaces use meanings which are void of a conceptual core – though the relations between the concepts, represented by place holder words, may still be defined, both absolutely (for example in the *is-a* or *is-part-of* hierarchies) and episodically.
2. *The coherence or incoherence of content cannot be judged autonomously.*
   The coherence of stored content originates in the coherence of the external world.Therefore, only agents with contextual interfaces are able to relate content 'imported' by means of language to the data of their own experience. An agent without contextual interfaces, in contrast, has nothing but imported data – which is why the responsibility for their coherence lies solely with the users who store the data in the agent.

2.6 The SLIM Theory of Language

S = **S**urface Compositionality (methodological principle, cf. 1.6.1):

Syntactic-semantic composition assembles only concrete word forms, excluding the use of zero-elements, identity mappings, or transformations.

L = time-**L**inearity (empirical principle, cf. 1.6.5):

Interpretation and production of utterances are based on a strictly time-linear derivation order.

I = **I**nternal (ontological principle, cf. 2.3.1):

Interpretation and production of utterances are analyzed as cognitive procedures located inside the speaker-hearer.

M = **M**atching (functional principle, cf. 3.2.3):

Referring with language to past, current, or future objects and events is modeled in terms of pattern matching between language meanings and a context.

2.6.1 First principle of pragmatics (PoP-1)

> The speaker's utterance meaning$_2$ is the use of the sign's literal meaning$_1$ relative to an internal context.

Meaning$_1$ is the *literal meaning* of the sign, meaning$_2$ is the *speaker meaning* of an utterance in which the sign's meaning$_1$ is used. Even in the hearer-mode, meaning$_2$ is called the 'speaker meaning' because communication is successful only if the hearer uses the sign's meaning$_1$ to refer to the same objects or events as the speaker.

A sign can only be used successfully if the context of interpretation has been determined (and delimited) correctly. Finding the context is based on the sign's STAR:

S = space (location where the sign has been uttered)
T = time (time when the sign has been uttered)
A = author (agent who produced the sign)
R = recipient (agent intended to receive the sign)

2.6.2 Second principle of pragmatics (PoP-2)

A sign's STAR determines the *entry context* of production and interpretation in the contextual databases of the speaker and the hearer.

2.6.3 Third principle of pragmatics (PoP-3)

The matching of signs with their respective sub-contexts is incremental, whereby in production the elementary signs follow the time-linear order of the underlying thought path, while in interpretation the thought path follows the time-linear order of the incoming elementary signs.

2.6.4 Fourth principle of pragmatics (PoP-4)

The reference mechanism of a *symbol* is based on a meaning_1 which is defined as a concept type. Symbols refer from their place in a positioned sentence by matching their meaning_1 with corresponding concept tokens at the context level.

2.6.5 Fifth principle of pragmatics (PoP-5)

The reference mechanism of an *indexical* is based on a meaning$_1$ which is defined as one of two characteristic pointers. The first points into the agent's context and is called the context pointer or C. The second points at the agent and is called the agent pointer or A.

2.6.6 Indexicals as nouns and adjectives with A and C pointers

noun A	*noun C*	*adj A*	*adj C*
I, we	you	here	there
	he, she, it	now	then
	this, they		

2.6.7 Sixth principle of pragmatics (PoP-6)

The reference mechanism of a *name* is based on a private marker which matches a corresponding marker contained in the cognitive representation of the object referred to.

2.6.8 Seventh principle of pragmatics (PoP-7)

Symbols occur as verbs, adjectives, and nouns. *Indexicals* occur as adjectives and nouns. *Names* occur only as nouns.

2.6.9 Relation between the kinds of sign and the parts of speech

name	Fido		
indexical	this	here	
symbol	dog	black	see
	noun	*adj.*	*verb*

2.6.10 Correlation of part of speech and kind of sign in sentences

	noun	verb	adjective
name	John		
symbol		slept	
symbol			in the kitchen
indexical	he		
symbol		slept	
indexical			there