4. Concept Types and Concept Tokens

4.1 Kinds of Proplets

4.1.1 Examples of the three main kinds of proplets

noun proplet	*verb proplet*	*adj proplet*
sur:	sur:	sur:
noun: book	verb: read	adj: blue
cat: sn	cat: decl	cat: adn
sem: def sg	sem: pres	sem:
mdr: blue	mdr:	mdr: B
fnc: buy	arg: John book	mdd: book 3
idy: 3	pc: 15 sit	idy: B
nc:	nc: 17 sleep	nc:
pc:	prn: 16	pc:
prn: 11		prn: 20

4.1.2 Proplet attributes and their values

1. Surface attribute: sur
   All proplets have a surface attribute. If it has the value NIL, the proplet is a context proplet. In language proplets, it gets its non-NIL value from the lexicon.

2. Core attributes: noun, verb, adj
   The core attribute of a proplet gets its unique value from the lexicon. From a sign-theoretic point of view,the core values may be a *concept*, a *pointer*, or a *marker*, which corresponds to the sign kinds of *symbol, indexical* and *name*.

3. Grammatical attributes: cat, sem
   The grammatical attributes cat (category) and sem (semantics) get their initial values from the lexicon; they may be modified during the derivation.

4. Intra-propositional continuation attributes: fnc, arg, mdd, mdr
   The intra-propositional continuation attributes get their value(s) by copying during the time-linear composition of proplets (cf. 3.4.2). The values consist of characters (char), which represent the names of other proplets. In complete propositions, the values of fnc (functor), arg (argument), and mdd (modified) must be non-NIL (obligatory continuation attributes), while that of mdr (modifier) may be NIL (optional continuation attribute).

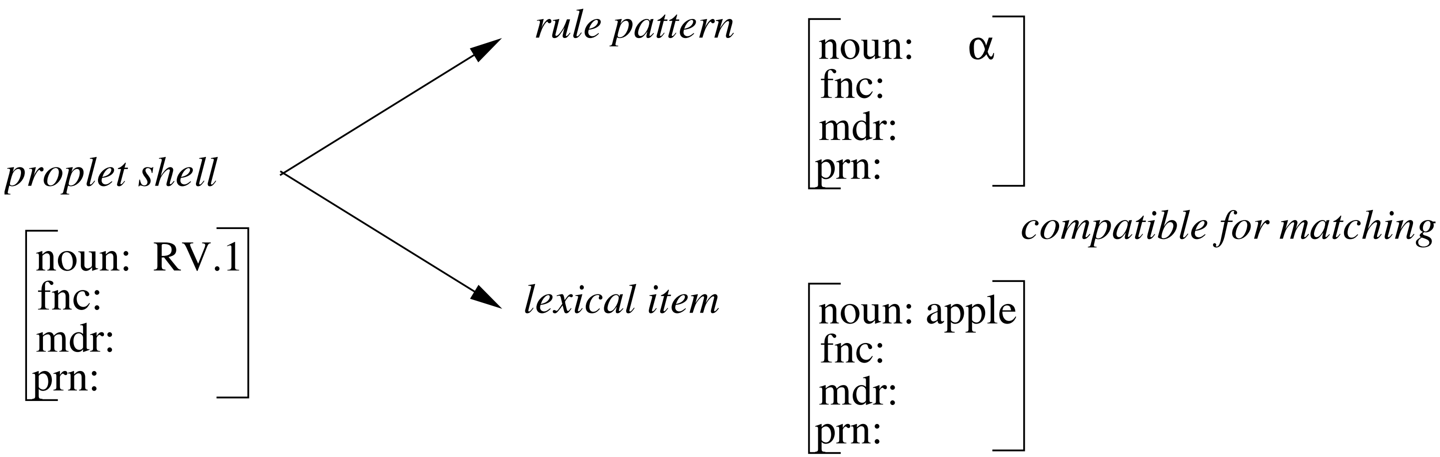
5. Extra-propositional continuation attributes: nc, pc, idy
   The extra-propositional continuation attributes nc (next conjunct), pc (previous conjunct), and idy (identity) are used extra- and intra-propositionally. Their extra-propositional use is obligatory (in a text, at least one of these attributes must have a non-NIL value), while their intra-propositional use is optional. Like intra-propositional continuation attributes, they get their values by copying.

6. Book-keeping attribute: prn
   The book-keeping attribute prn (proposition number) gets its value from the control structure of the parser and consists of a number (integer). Additional book-keeping attributes are wrn (word number), and trc (transition counter), which serve in the implementation.

4.1.3 Substituting a replacement variable with a core value

semantic core	*proplet shell*	*lexical proplet*
apple	$\begin{bmatrix}\text{noun: RV.1}\\ \text{fnc:}\\ \text{mdr:}\\ \text{prn:}\end{bmatrix}$	$\begin{bmatrix}\text{noun: apple}\\ \text{fnc:}\\ \text{mdr:}\\ \text{prn:}\end{bmatrix}$

4.1.4 Relating proplet shells, lexical items, and rule patterns

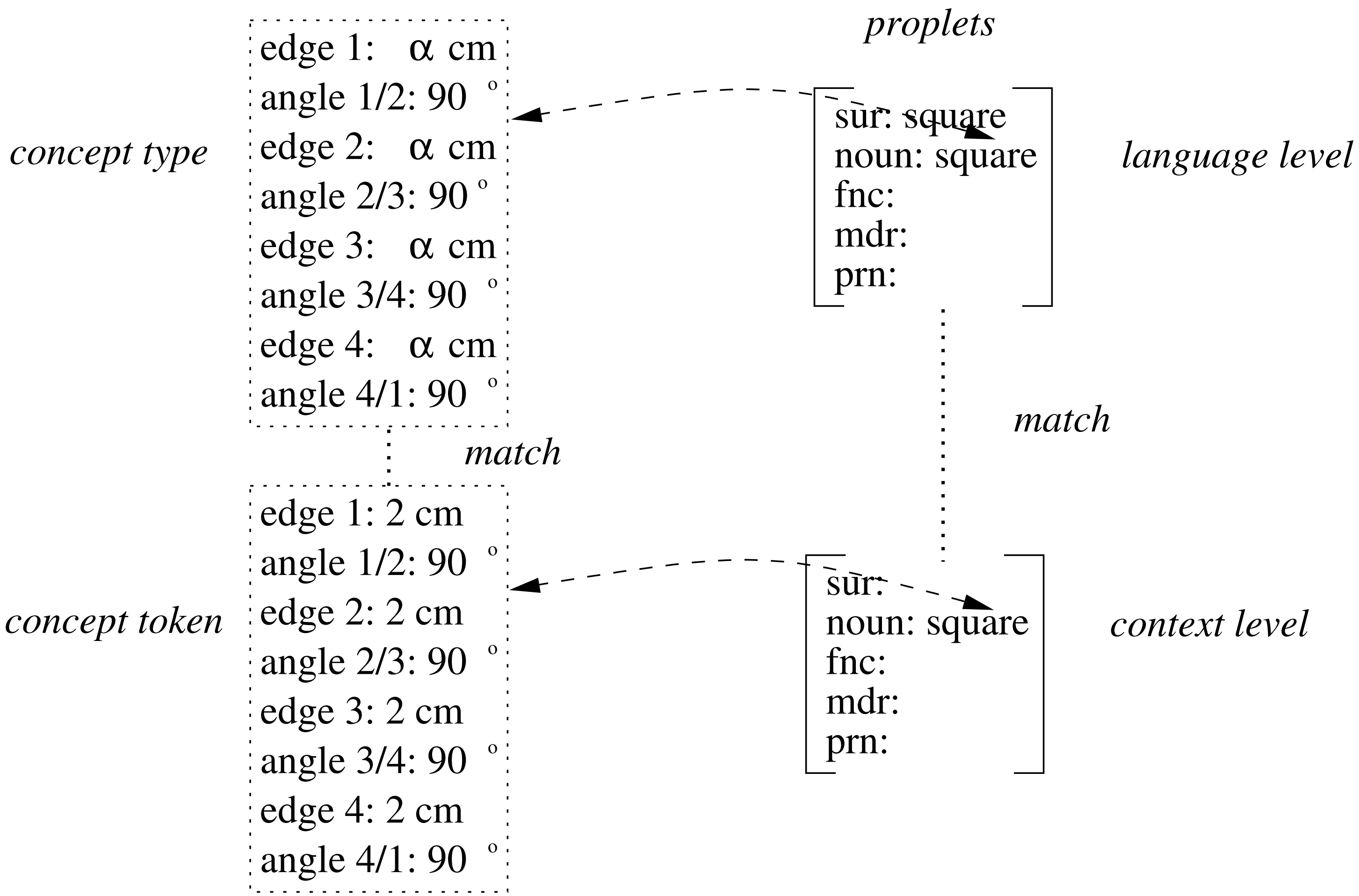


4.2 Type-Token Relation for Establishing Reference

4.2.1 TYPE AND TOKEN OF THE CONCEPT *square*

type	*token*
edge 1: α	edge 1: 2cm
angle 1/2: 90^o	angle 1/2: 90^o
edge 2: α	edge 2: 2cm
angle 2/3: 90^o	angle 2/3: 90^o
edge 3: α	edge 3: 2cm
angle 3/4: 90^o	angle 3/4: 90^o
edge 4: α	edge 4: 2cm
angle 4/1: 90^o	angle 4/1: 90^o

4.2.2 Concepts as values of the core attributes

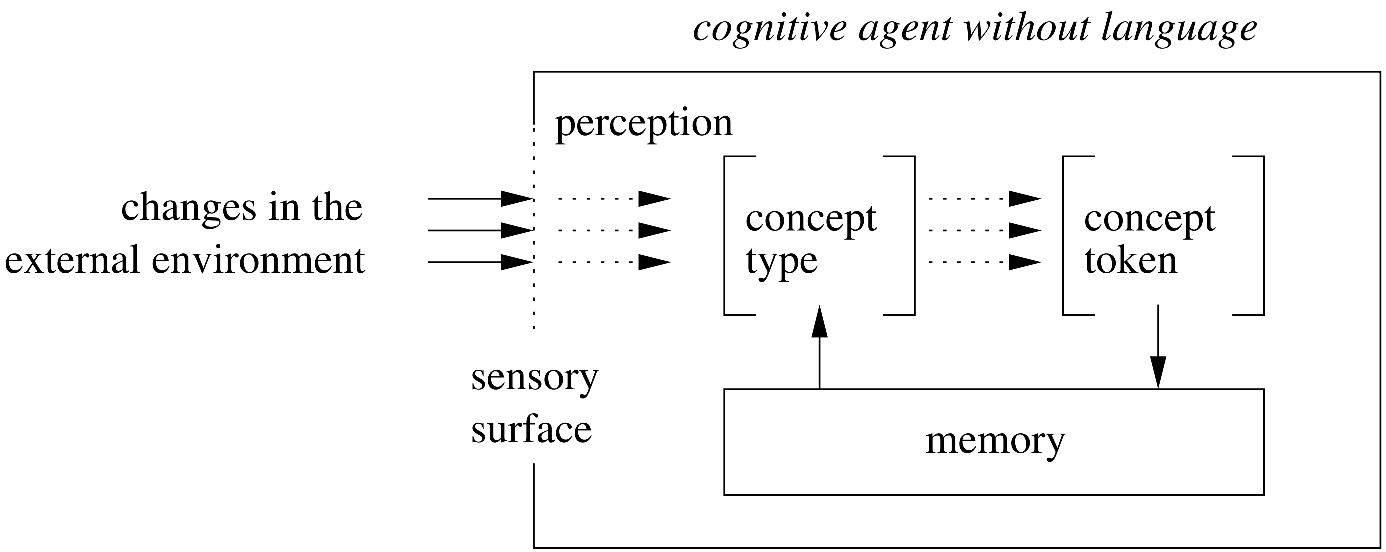


4.2.3 Why the type-token relation is important

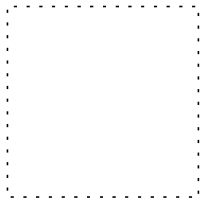
Type-token relations based on feature structures with variables and constants are easily computed. Procedures matching the concept type of a language proplet with the concept token of a context proplet enable the language proplet to refer in different utterance situations to different context proplets, including reference to items never encountered before.

4.3 Context Recognition

4.3.1 Concept type and concept token in contextual recognition



4.3.2 Concept type and concept token in recognizing a square

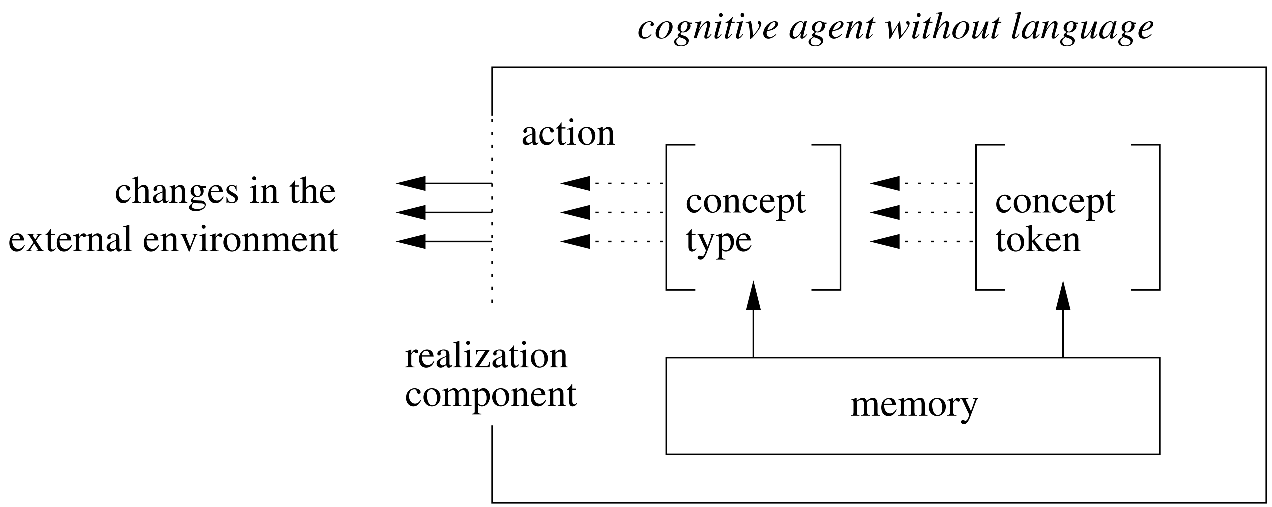


bitmap outline

$$\Longrightarrow \underbrace{\begin{bmatrix} \text{edge 1: } \alpha \text{ cm} \\ \text{angle 1/2: } 90° \\ \text{edge 2: } \alpha \text{ cm} \\ \text{angle 2/3: } 90° \\ \text{edge 3: } \alpha \text{ cm} \\ \text{angle 3/4: } 90° \\ \text{edge 4: } \alpha \text{ cm} \\ \text{angle 4/1: } 90° \end{bmatrix}}_{\textit{concept type}} \Longrightarrow \underbrace{\begin{bmatrix} \text{edge 1: } 2 \text{ cm} \\ \text{angle 1/2: } 90° \\ \text{edge 2: } 2 \text{ cm} \\ \text{angle 2/3: } 90° \\ \text{edge 3: } 2 \text{ cm} \\ \text{angle 3/4: } 90° \\ \text{edge 4: } 2 \text{ cm} \\ \text{angle 4/1: } 90° \end{bmatrix}}_{\textit{concept token}}$$

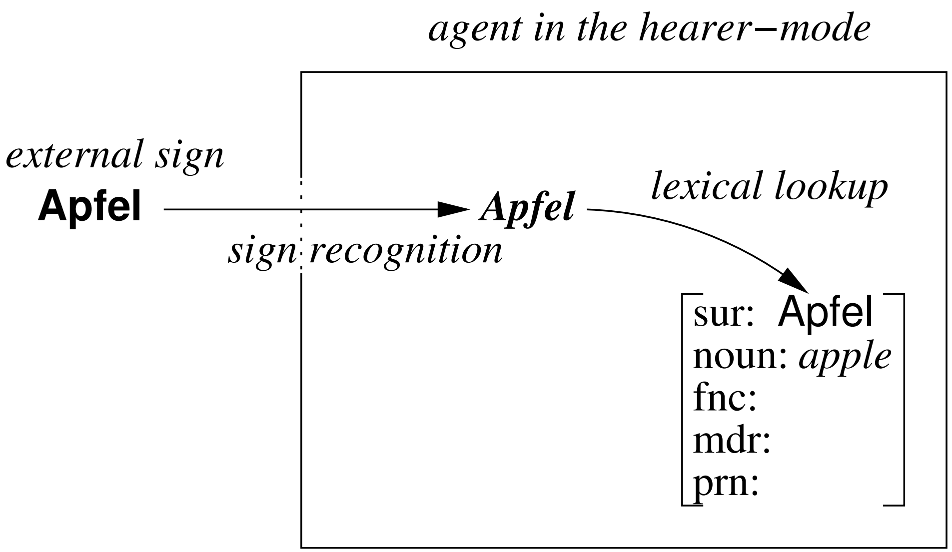
4.4 Context Action

4.4.1 Concept types and concept tokens in action

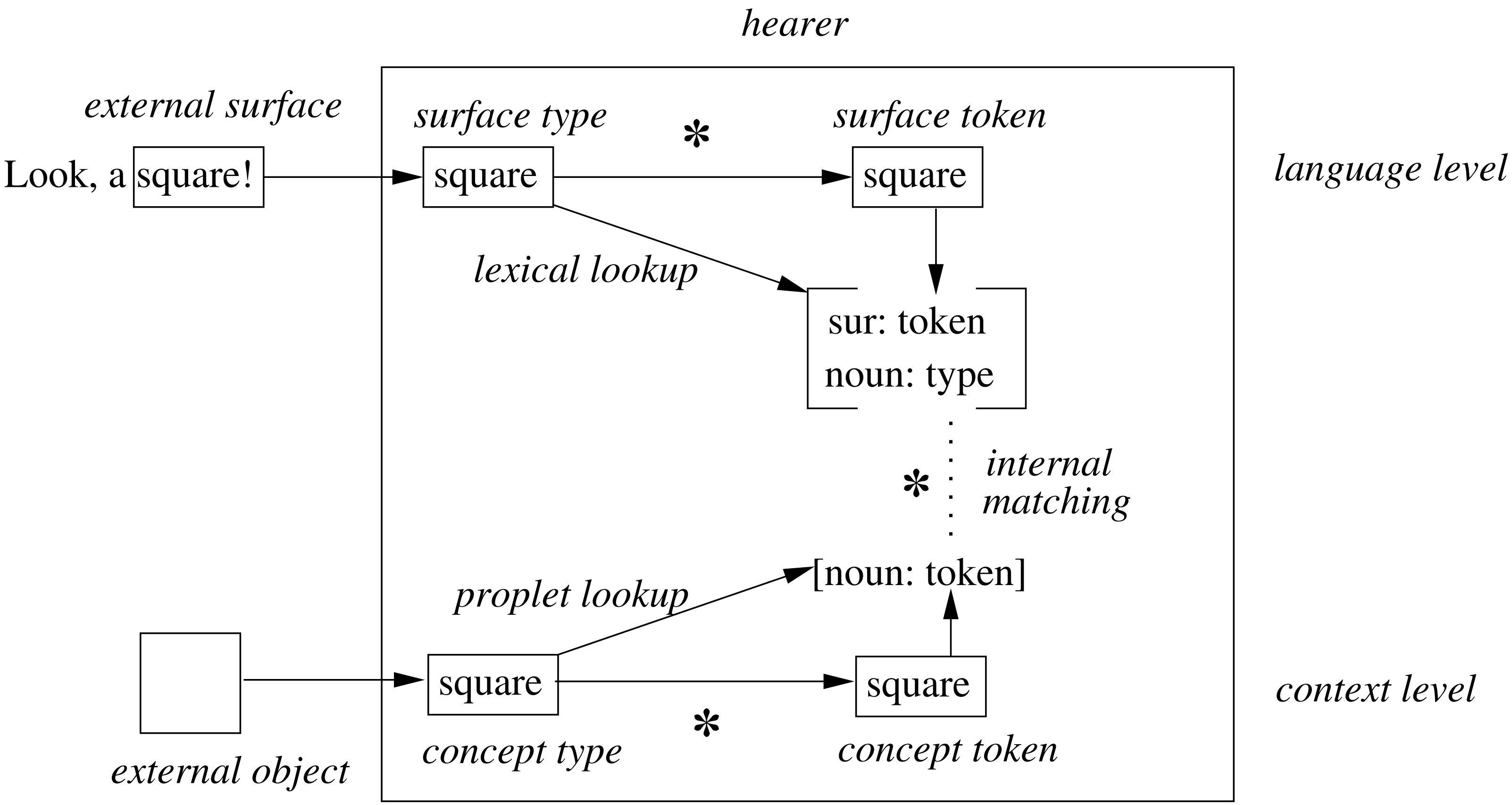


4.5 Sign Recognition and Production

4.5.1 LEXICAL LOOKUP OF GERMAN Apfel IN THE HEARER-MODE



4.5.2 Three type-token relations in the cycle of communication



4.6 Universal versus Language-Dependent Properties

4.6.1 Hierarchy of notions and distinctions in Database Semantics