21. Absolute and contingent propositions

21.1 Absolute and contingent truth

21.1.1 Notion of proposition in logic

Specialized use, representing sentences which do not require knowledge of the utterance situation for semantic interpretation. This use is problematic because it constitutes a hybrid between an *utterance* and an *expression*.

21.1.2 Absolute propositions

Express scientific or mathematical contents. These are special in that they make the interpretation largely independent from the usual role of the speaker. For example, in
In a right-angled triangle, it holds for the hypotenuse A and the cathetes B and C that $A^2 = B^2 + C^2$.
the circumstances of the utterance have no influence on interpretation and truth value.

21.1.3 Logical truth for absolute propositions

Logical truth is represented by the metalanguage words false and true referring to the set-theoretic objects $\emptyset$ und $\{\emptyset\}$, respectively. These serve as model-theoretic fix points into which the denotations of propositions are mapped by the metalanguage rules of interpretation.

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21.1.4 Contingent propositions

Express everyday contents such as Your dog is doing well.
Can only be interpreted – and thereby evaluated with respect to their truth value – if relevant circumstances of utterance situation (STAR point) are known.

21.1.5 Natural truth for contingent proposition

Represented by the truth values true^c and false^c. A contingent proposition such as
The Persians have lost the battle
is true^c, if the speaker is an eye witness who is able to correctly judge and communicate the facts, or if there exists a properly functioning chain of communication between the speaker and a reliable eye witness.

21.1.6 Procedural definition of the natural truth values true^c and false^c

A proposition – or rather a statement – uttered by, e.g., a robot is evaluated as true^c, if all procedures contributing to communication work correctly. Otherwise it is evaluated as false^c.

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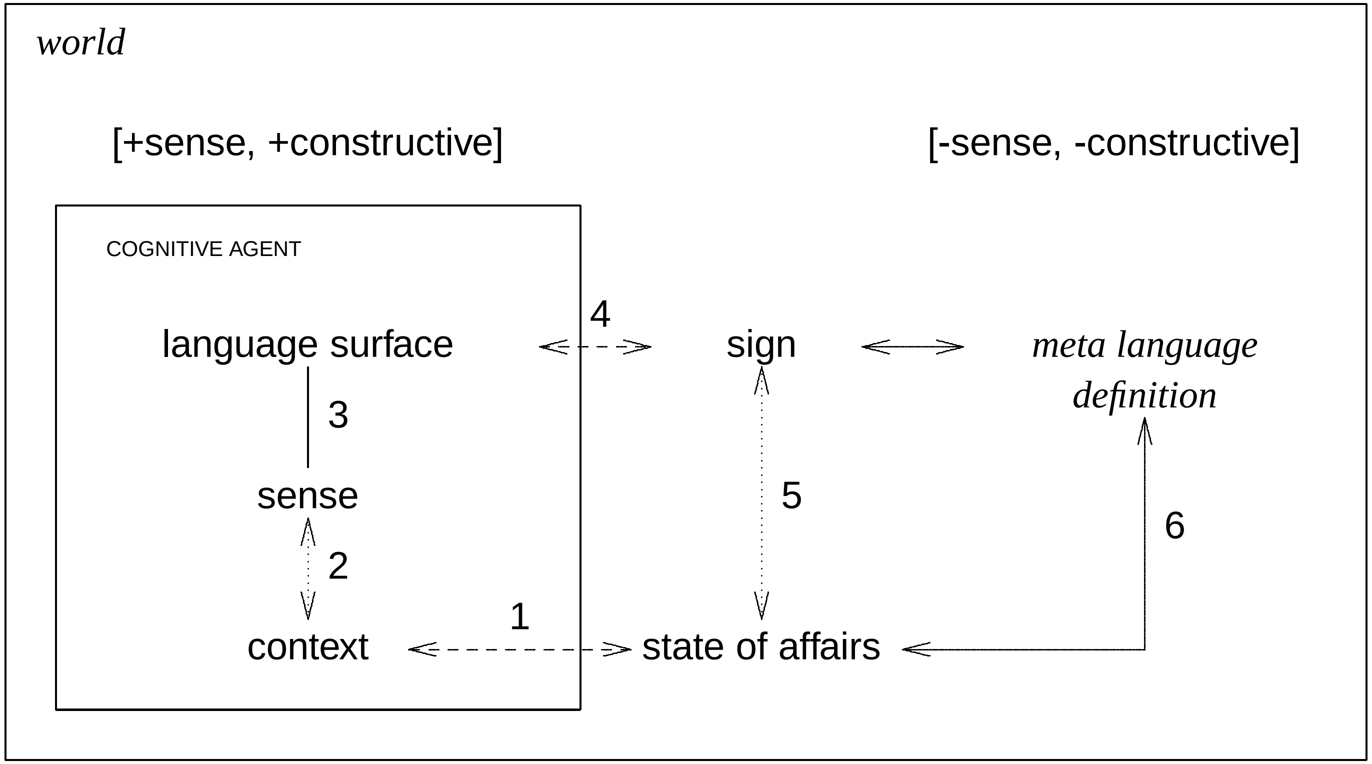
21.1.7 Comparing natural and logical truth



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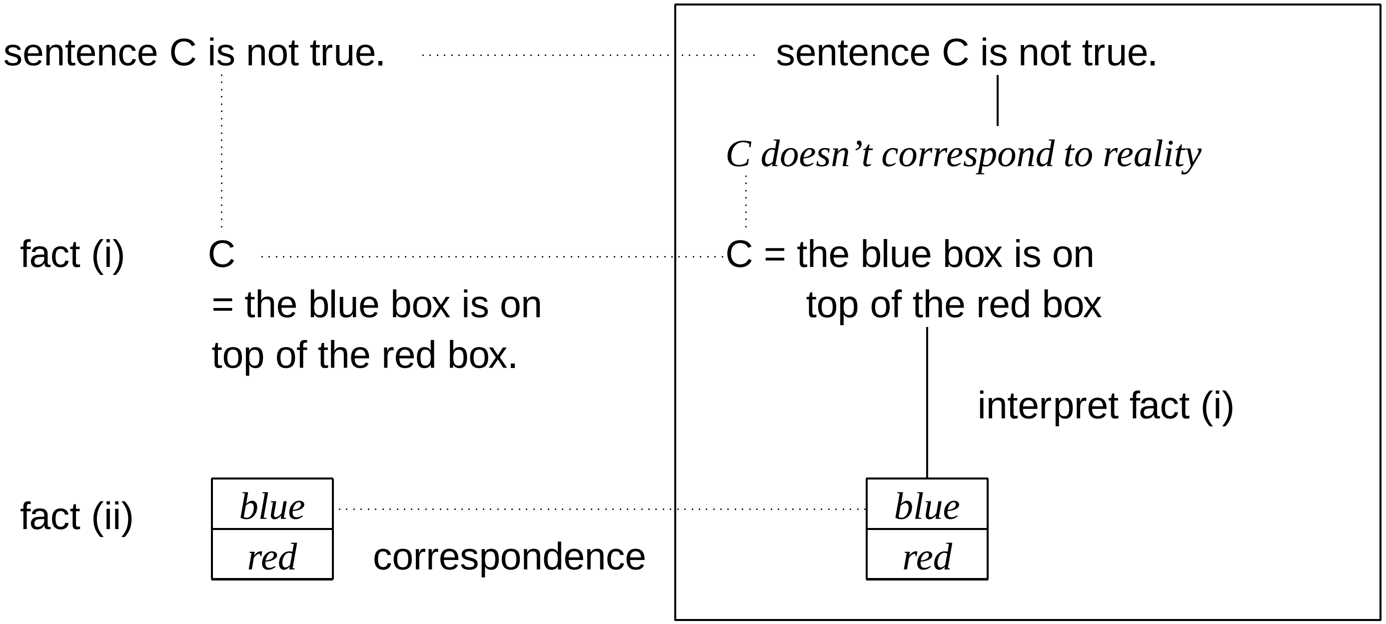
21.2 Epimenides in a [+sense,+constructive] system

21.2.1 Benign case of a language-based abbreviation



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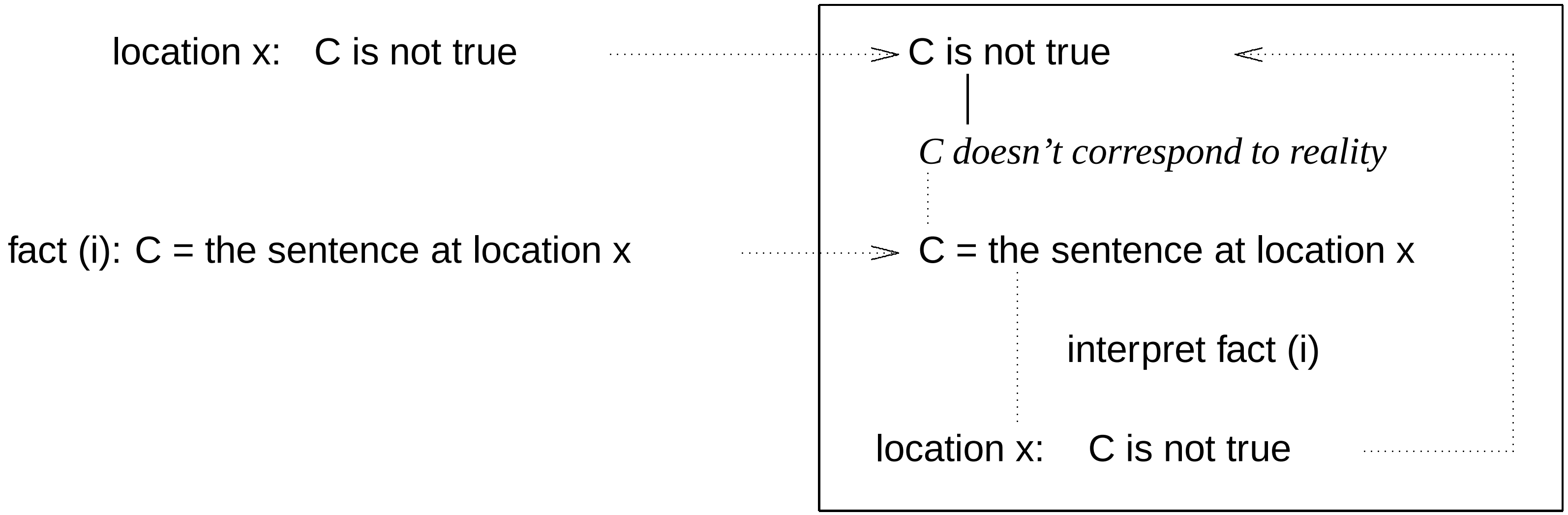
21.2.2 A [+constructive,+sense] reanalysis of the Epimenides paradox



21.2.3 How the [+constructive,+sense] reanalysis disarms the Epimenides paradox

- the words true^c and false^c may be part of the object language without causing a logical contradiction in its semantics, and
- the recursion caused by the Epimenides paradox can be recognized in the pragmatics and taken care of without adversely affecting the communicative functioning of the system.

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21.2.4 Basis of the reanalysis of the Epimenides paradox

The distinction between (i) the logical truth values 1 and 0 from the T-condition and (ii) the natural truth values true^c and false^c from the object language replaces Tarski's logical contradiction

a. C is 1 if and only if C is not 1

by the contingent statement

b. C is 1 if and only if C is not true^c.

21.2.5 Why the reanalysis is not open to logical semantics

The procedural notion of natural truth – essential for avoiding Tarski's contradiction – can be neither motivated nor implemented outside a [+constructive,+sense] ontology.

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21.3 Frege's principle as homomorphism

21.3.1 The communicative function of natural syntax

is the composition of semantic representations by means of composing the associated surfaces. Montague formalized this structural correlation between syntax and semantics mathematically as a *homomorphism*.

21.3.2 Intuitive notion of a homomorphism

A structural object so is homomorphic to another structural object SO, if for each basic element of so there is a (not necessarily basic) counterpart in SO, and for each relation between elements in so there is a corresponding relation between corresponding elements in SO.

21.3.3 Homomorphism as a relation between two (uninterpreted) languages

Language-2 is homomorphic to language-1 if there is a function T which

- assigns to each word of category a in language-1 a corresponding expression of category A in language-2, and
- assigns to each n-place composition f in language-1 a corresponding n-place composition F in language-2, such that
- T(f(a,b)) = F((T(a))(T(b)))

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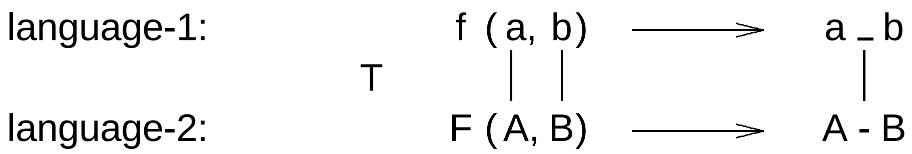
21.3.4 Schematic representation of Montague's homomorphism



21.3.5 Syntactic composition with homomorphic semantics

21.3.6 Why the homomorphism condition by itself is not sufficient as a formalization of Frege's principle

Frege's principle is defined for *analyzed* surfaces, whereas natural language communication is based on *unanalyzed* surfaces. The problem is that the transition from unanalyzed to analyzed surfaces (interpretation) and vice versa (production) has been misused to enrich the levels of the analyzed surface and/or the meaning$_1$ by means of zero elements or identity mappings.

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21.3.7 **Use of zero element** (illegal)

1. Smuggling in during interpretation (↓) – Filtering out during production (↑)

unanalyzed surfaces:	a’				a’
	|				|
analyzed surfaces:	a	○	b#	→	ab#
	|		|		|
$meanings_1$:	A	○	B	→	AB

Postulated whenever the unanalyzed surface does not contain what the grammar theory would like to find.

Peter drank DET# wine YOU# help me!

2. Filtering out during interpretation (↓) – Smuggling in during production (↑)

unanalyzed surfaces:	a’		b’		ab’
	|		|		|
analyzed surfaces:	a	○	b#	→	ab#
	|				|
$meanings_1$:	A			→	A

Postulated whenever the surface contains something which the grammar theory would not like to find.

Peter believes THAT# Jim is tired. mixed:DET# wine WAS# ordered BY# Peter
mixed: Peter promised Jim TO# Peter# sleep mixed: Peter persuaded Jim TO# Jim# sleep.

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21.3.8 Use of identity mapping (illegal)

1. Filtering out during production (↑) – Smuggling in during interpretation (↓)

unanalyzed surfaces:	a’		b’		a’
	|		|		|
analyzed surfaces:	a	∘	b	→	ab#
	|		|		|
meanings_1:	A	∘	B	→	AB

2. Smuggling in during production (↑) – Filtering out during interpretation (↓)

unanalyzed surfaces:	a’		b’		ab’
	|		|		|
analyzed surfaces:	a	∘	b	→	ab#
	|		|		|
meanings_1:	A	∘	B	→	A

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21.3.9 Surface compositionality II (SC-II principle)

A semantically interpreted grammar is surface compositional if and only if

- the syntax is restricted to the composition of concrete word forms (i.e. no zero elements and no identity mappings),
- the semantics is homomorphic to the syntax, and
- objects and operations on the level of semantics which correspond to the syntax in accordance with the homomorphism condition may not be realized by zero elements or identity mappings.

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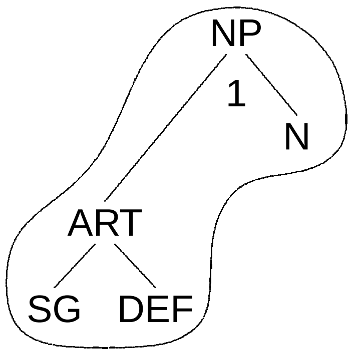
21.4 Time-linear syntax with homomorphic semantics

21.4.1 Time-linear build-up of semantic hierarchies

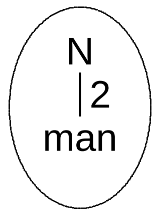
- Step 1: *Translation of word forms into component hierarchies*
  Each word form is mapped into a semantic component hierarchy (tree). The structure of the tree is determined by the syntactic category of the word form.
- Step 2: *Left-associative combination of component hierarchies*
  For each combination of the left-associative syntax there is defined a corresponding combination of component hierarchies on the level of the semantics.

21.4.2 Derivation of component hierarchies from word forms

the
(SN′ SNP) →



man
(SN) →



21.4.3 Time-linear composition with homomorphic semantics

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21.4.4 Why 21.4.3 is not a constituent structure

A constituent structure analysis would proceed on the assumption that gave is semantically closer to the woman and the book than to the man.

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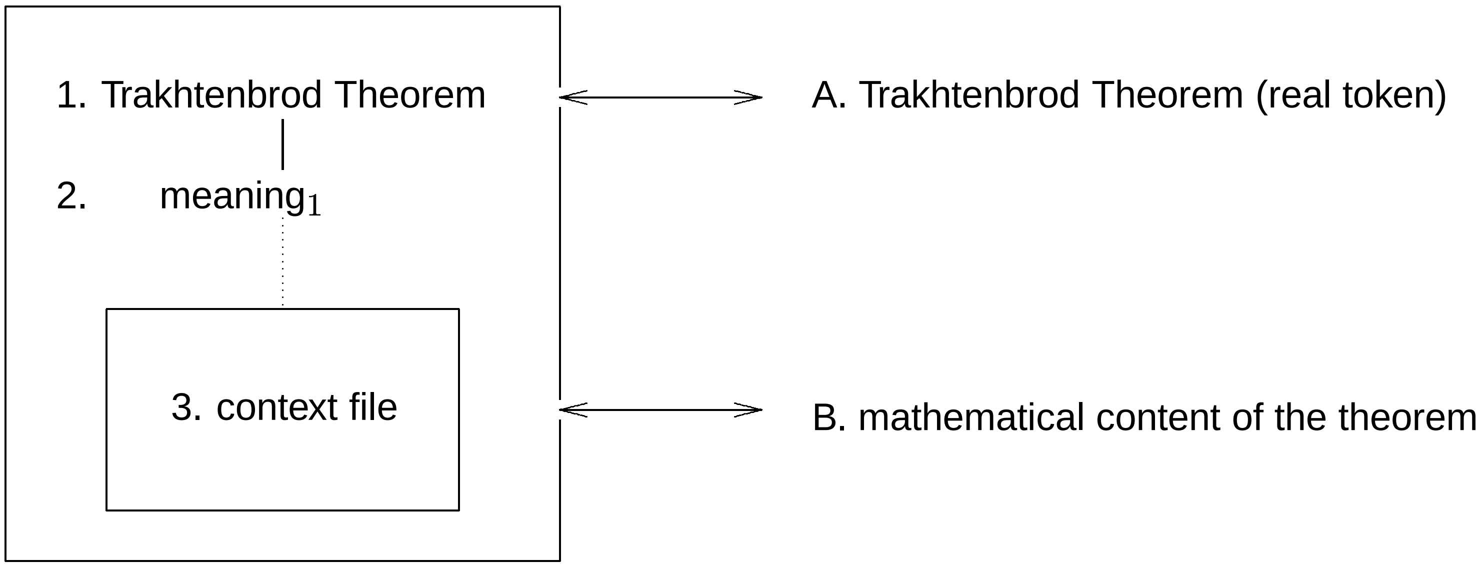
21.5 Complexity of natural language semantics

21.5.1 Low complexity of syntactic system may be pushed sky high by semantic interpretation

(a) π | 3.14159265...

(b) 1:3 | 1' :' 3' = 0.333...

21.5.2 Interpretation of 'Trakhtenbrod Theorem' within SLIM theory



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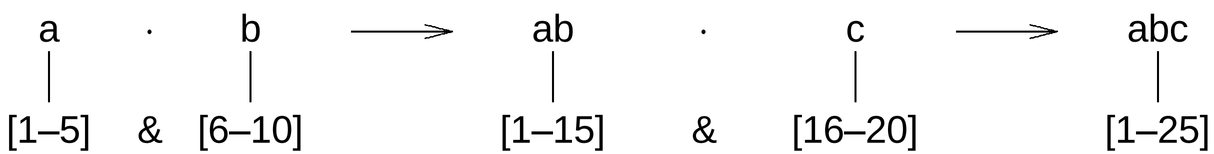
21.5.3 CoNSem hypothesis (Complexity of Natural language Semantics)

The interpretation of a natural language syntax within the C-LAGs is empirically adequate only if there is a finite constant k such that

- it holds for each elementary word form in the syntax that the associated semantic representation consists of at most k elements, and
- it holds for each elementary composition in the syntax that the associated semantic composition increases the number of elements introduced by the two semantic input expressions by maximally k elements in the output.

This means that the semantic interpretation of syntactically analyzed input of length n consists of maximally $(2n - 1) \cdot$ k elements.

21.5.4 Illustration of CoNSem hypothesis with k = 5



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