

Stages: features and topics

Syntax

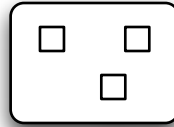
Semantics

Singular symbols
Semiotics issues

Increasing structural complexity (and meta-linguistic sophistication)



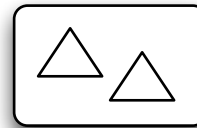
Distinct atomic symbols
Distinction/enumeration (coproduct), cardinality, injection/surjection, isomorphism



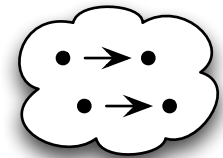
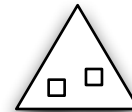
Compound symbols
Products, cardinality, lexicographic ordering



Linear structure
Regular languages, numerals, alternative notations (bases, Peano)



Hierarchical (tree-like) structure
Context-free languages, concrete vs. abstract syntax, algebras, ranks and sorts, equational reasoning, calculation traces, alternative notational orders



Decl. variables (several kinds)
Substitution, functional semantics, polynomials, environments, partial evaluation

Imp. variables, while progs
Evaluation order, semantic states, abstract machines, monadic semantics, etc.

Functional abstraction
Lambda calculus, closures, reduction, evaluation order, continuations?, etc.

Type theory
Typing and equality judgements, propositions-as-types, deductions, higher-order syntax

