Basic Grammars

shapes

↓

spatial relations

↓

addition rules

↓

basic grammar
spatial relation  A + B

addition rules

A → A + B
B → A + B
spatial relation $A + B$ between two oblongs

addition rule $A \rightarrow A + B$ based on the spatial relation
different labelings of the rule $A \rightarrow A + B$
rule

initial shape
design

rule

initial shape
design
different labelings of the rule $A \rightarrow A + B$
spatial relation $A + B$ between two oblongs

$A \rightarrow A + B$

$B \rightarrow A + B$
different labelings of the rule $A \rightarrow A + B$

spatial relation $A + B$ between two oblongs
spatial relation $A + B$ between two oblongs

A $\rightarrow$ A + B

B $\rightarrow$ A + B
spatial relation $A + B$ between two oblongs

$A \rightarrow A + B$

$B \rightarrow A + B$
spatial relation $A + B$ between two oblongs
spatial relation $A + B$ between two oblongs

$A \rightarrow A + B$

$B \rightarrow A + B$
spatial relation  $A + B$ between two oblongs

different labelings of the rule $A \rightarrow A + B$

different labelings of the rule $B \rightarrow A + B$
rules

initial shape

rules

initial shape
rules

initial shape

design in language

rules

initial shape

design in language
Hierarchy of shape grammars

basic grammars

nondeterministic basic grammars

additive grammars

unrestricted grammars
Basic grammar

A linearly ordered set of basic rules $r_1, r_2, r_3, \ldots, r_n$ where each rule applies to the shape added by the previous rule $r_{n-1}$

Initial shape: the shape on the left-side of the first rule
BASIC GRAMMARS
one spatial relation, different labelings
BASIC GRAMMARS

different spatial relations
Design projects:

basic grammars using one spatial relation
historical museum, San Gimignano, Italy (Randy Brown)
spatial relation

rule

basic designs
spatial relation

basic designs
elementary school complex, Los Angeles
(Michael Brown)
elementary school complex, Los Angeles  (Michael Brown)
subway station, MIT campus (Gane, Gichuhi, Tian)
memorial to mining workers (Michael Wilcox)
memorial to mining workers (Michael Wilcox)
Design projects:

basic grammars using two spatial relations
pier, ocean observatory and education facility, Manhattan Beach, CA
(Randy Brown)
land building

ocean building
basic rules

land building computation

ocean building computation
cultural history museum, Los Angeles
(Jin-Ho Park)
cultural history museum, Los Angeles (Jin-Ho Park)
courtyard houses, Malibu, CA
(Jin-Ho Park)
courtyard houses, Malibu, CA (Jin-Ho Park)
courtyard houses, Malibu, CA  (Jin-Ho Park)
Nondeterministic basic grammar

A partially ordered set of basic rules where each rule applies to the shape added by a previous rule.

Initial shape: the shape on the left-side of the first rule.
NONDETERMINISTIC BASIC GRAMMARS
ND basic grammar

NONDETERMINISTIC BASIC GRAMMARS
ND basic grammar

NONDETERMINISTIC BASIC GRAMMARS