String Grammars

String grammars form the basis of formal language theory. These grammars are defined over a vocabulary (finite set of symbols). Each grammar represents a set of sequences over this vocabulary.

formal grammar is a four-tuple G=(N,T,P,S)

Where:

N is a finite set of non-terminal symbols.

T is a finite set of terminal symbols

P is a finite set of productions, rewriting rules

and SϵN is the starting symbol

Note: N$\cap$T=Ø

V=NU$\dot{}$T

Example:

Let G=(N,T,P,S)

Where:

N={S,A,B},
T={a,b,c}
P={S → cAb , A→ aBa, B→aBa, B→cb}.

This grammar generate the language
L(G) = {ca^{n}cba^{n}b\n≥1}

For n=2

S→ cAb → caBab →caaBaab → caacbaab

Matrix Grammar

A matrix grammar is a quadruple G=(N,T,M,S)

where N,T,S are exactly in base grammar

and M is a finite set of sequences of the form

$$m:(r_1,r_2,\ldots,r_n) \ , \ n\geq 1$$

with the usual rewriting rules $r_i : \alpha_i \rightarrow \beta_i$

over

V=NUT.

Such a sequence m is called a matrix of rules.

EXAM PLE:

M1:(S→ABC)
M2:(A→Aa, B→ Bb, C →Cc)
M3:(A→a ,B →b ,C →c)

We find that:

$$L(G)=\{a^n b^n c^n : n\geq 1\}$$

shape grammar

A shape grammar is defined as

Where:

G=(S,L,P,I)

S is the set of shapes,

L is the set of symbols,

P is the set of production rules

I is the initial shape

Stages of shape grammar development:

SHAPES

↓

SPATIAL RELATIONS

↓

RULES

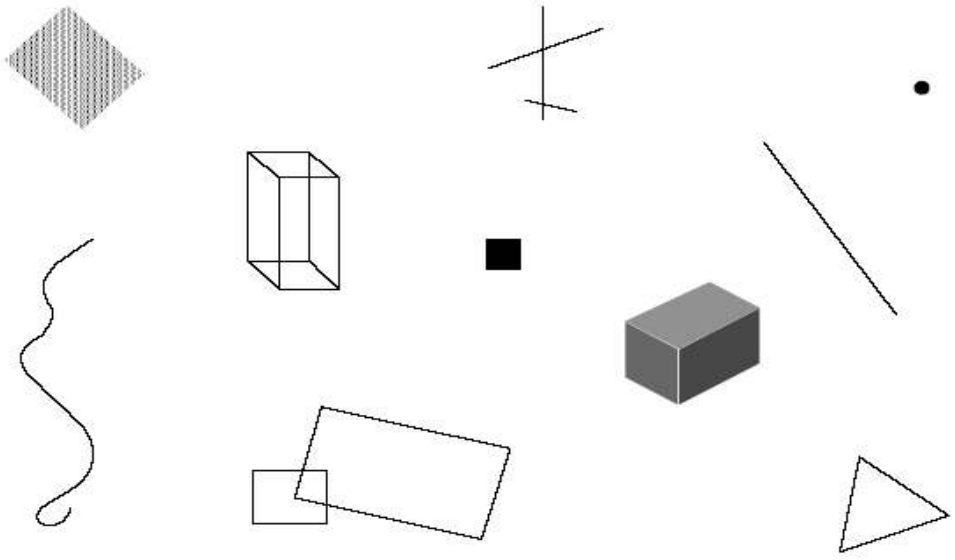
↓

SHAPE GRAMMAR

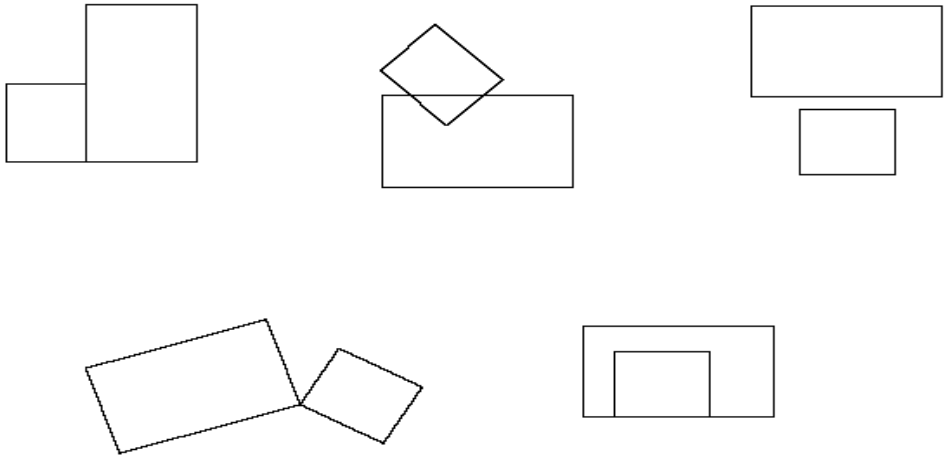
↓

DESIGN

shapes



spatial relations



Shape Rules

Shapes: A,B

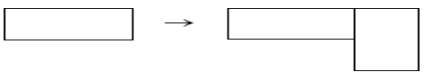
Spatial relations: A+B

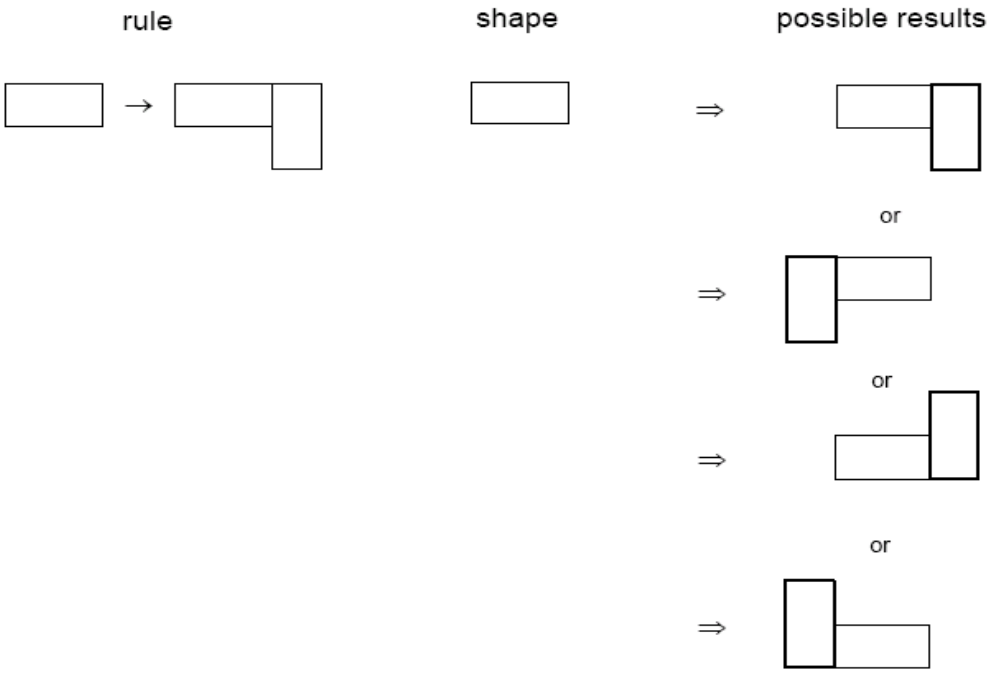
Rules: A→A+B

B→A+B

spatial relation

rule




rule
shape
possible results
or
or
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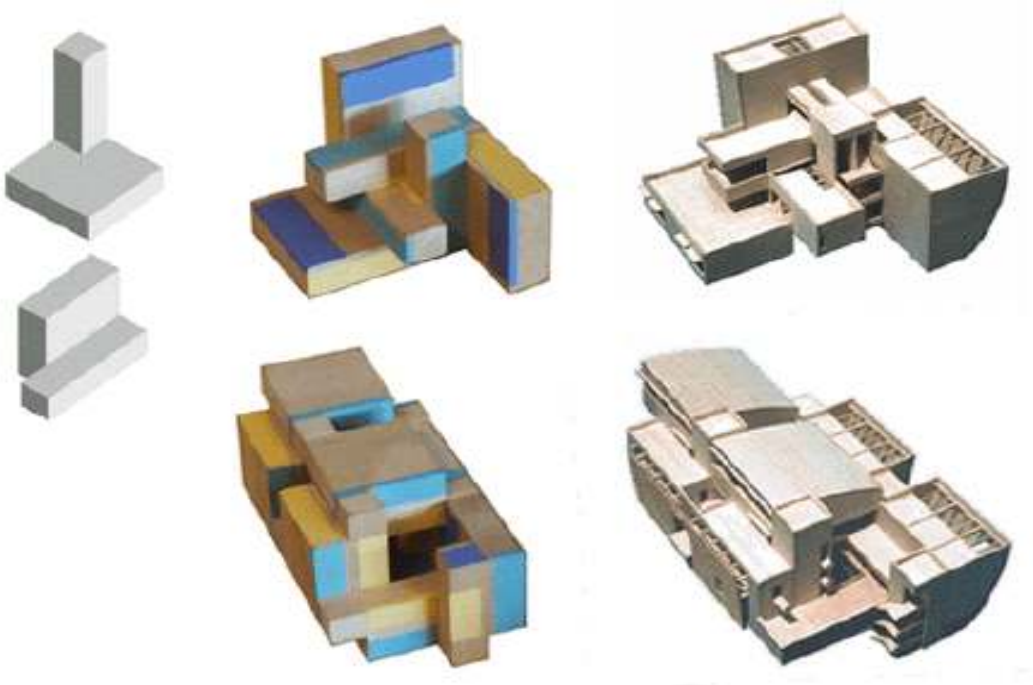

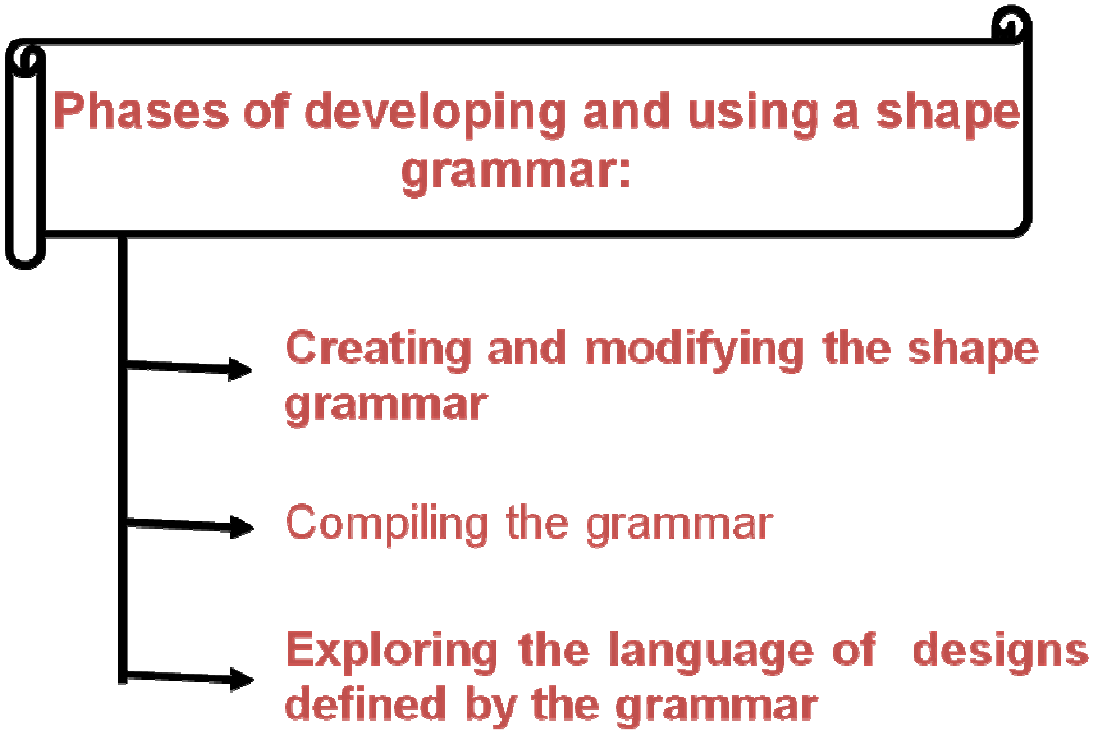

1-Creating and modifying the shape grammar .

The designer creates the rules and the initial shape.

2-Compiling the grammar.

In this phase the system compiles the rules (asks to see how the rule Applied to the pattern) .

3-Exploring the language of designs defined by the grammar

Designer explores the language of designs, generating designs, Imposing additional constraints or saving the current state.