48-747 Shape Grammars

Weights

consider shapes as embedded in a Cartesian space $U_{n,k}$ —
n-dimensional shapes in a k-dimensional space, $k \geq n$

U_0	$U_{0,0}$	$U_{0,1}$	$U_{0,2}$	$U_{0,3}$
U_1		$U_{1,1}$	$U_{1,2}$	$U_{1,3}$
U_2			$U_{2,2}$	$U_{2,3}$
U_3				$U_{3,3}$

+

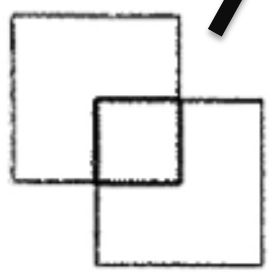
shape arithmetic

shape recognition

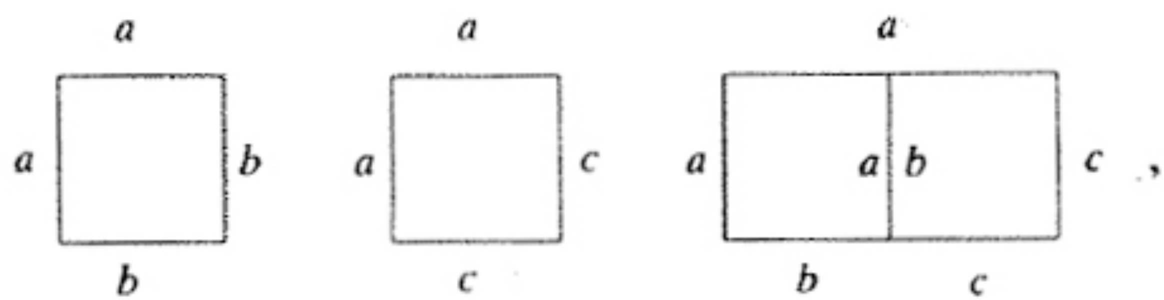
shape grammar

algebras

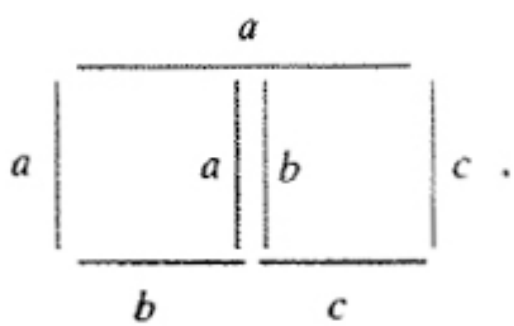
$U_{2,2}$

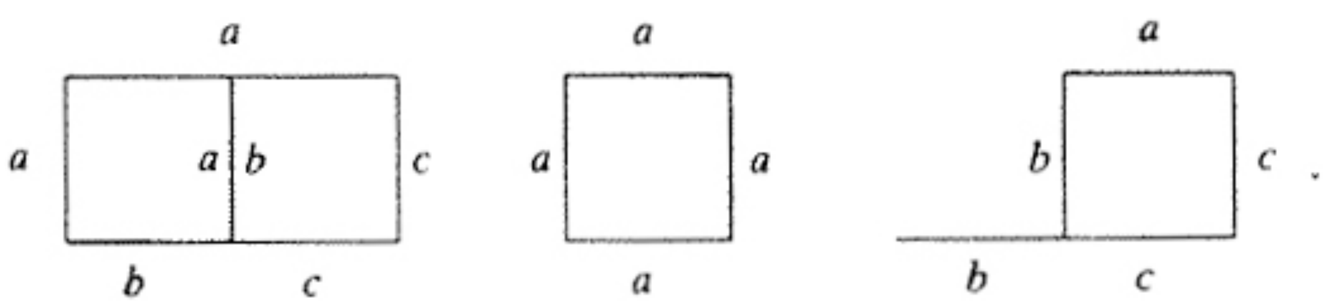


$U_{1,2}$



A B $A +_V B$





$A +_V B$ C $(A +_V B) -_V C$

a discussion of weights

Spatial element *l with ordinal weight w can be represented by the pair (l , w)*

Let the *empty* weighted element be denoted by 0.

Let *e (l ,w) = 0* *if l = 0*

0 if *w = 0*

(l , w) *otherwise*

SUM

(l , w) +t (l' , w') = e (l - l' , w) + (l °— l', max (w, w')) + e (l' - l , w')

DIFFERENCE

(l , w) -t (l' , w') =e (l - l' , w) + e (l °— l', max (w - w' , 0))

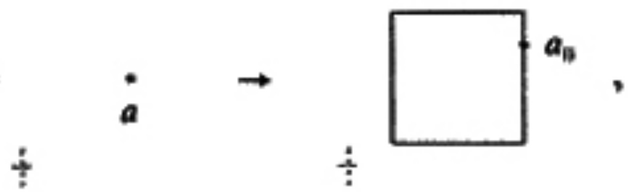
INTERSECTION

(l , w) °—t (l' , w') = (l °— l', min (w, w'))

SUBSHAPE

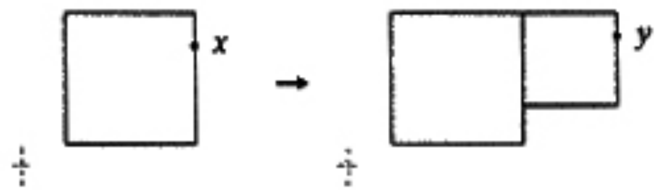
(l , w) £t (l' , w') Ül £ l' and w £ w'

(1)



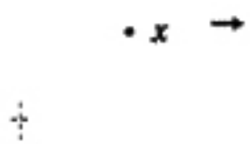
,

(2)

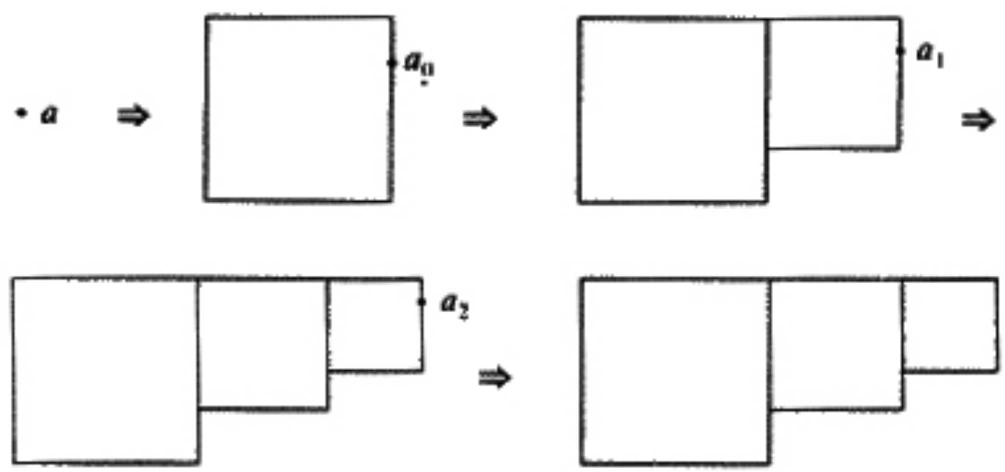


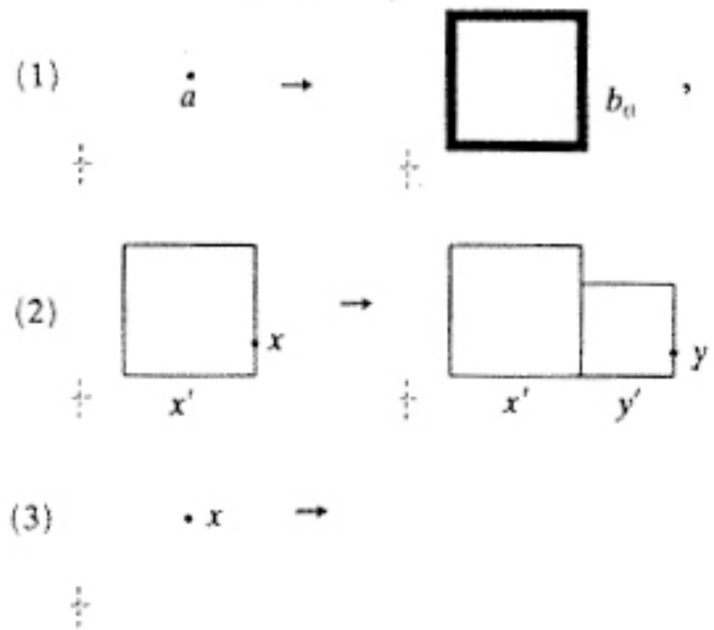
For $i \geq 0$:
$x = a_i$
$y = a_{i+1}$,

(3)



For $i \geq 0$:
$x = a_i$.





For $i \geqslant 0$:

$x = b_i$

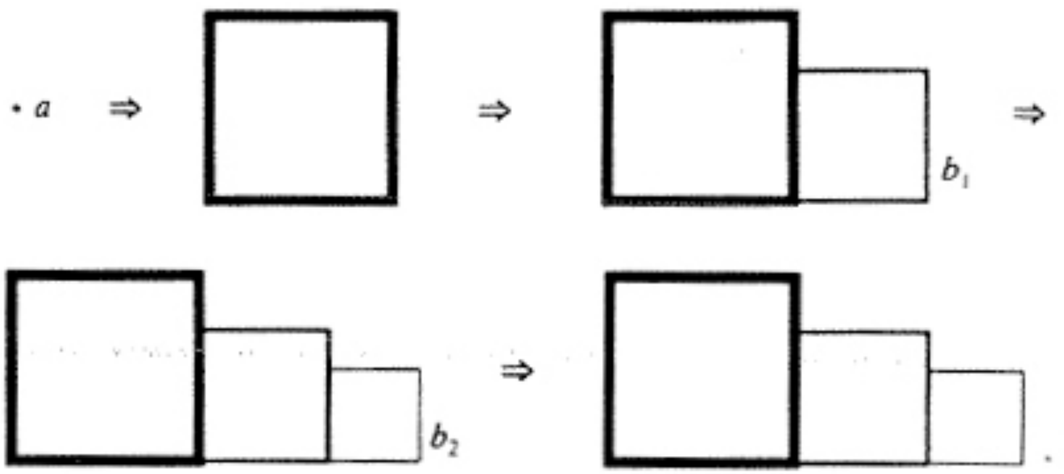
$x' = kr^i$

$y = b_{i+1}$

$y' = kr^{i+1}$,

For $i \geqslant 0$:

$x = b_i$.

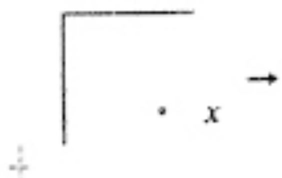


(1)

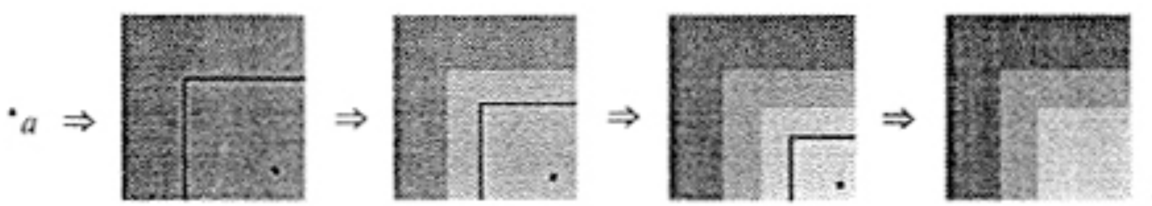
(2)

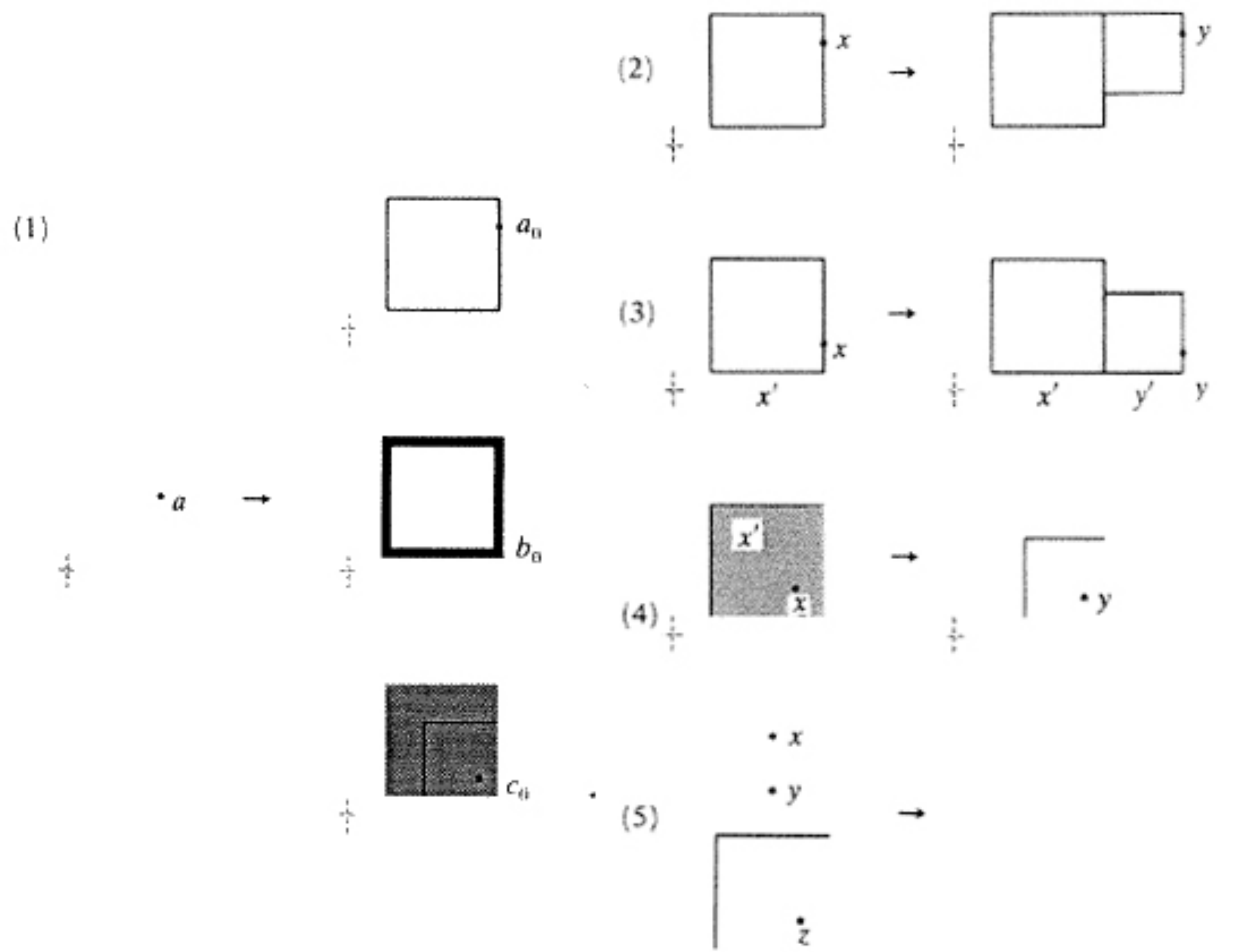
For $i \geqslant 0$:
$x = c_i$
$x' = kr^i(1-r)$
$y = c_{i+1}$.

(3)



For $i \geqslant 0$:
$x = c_i$.



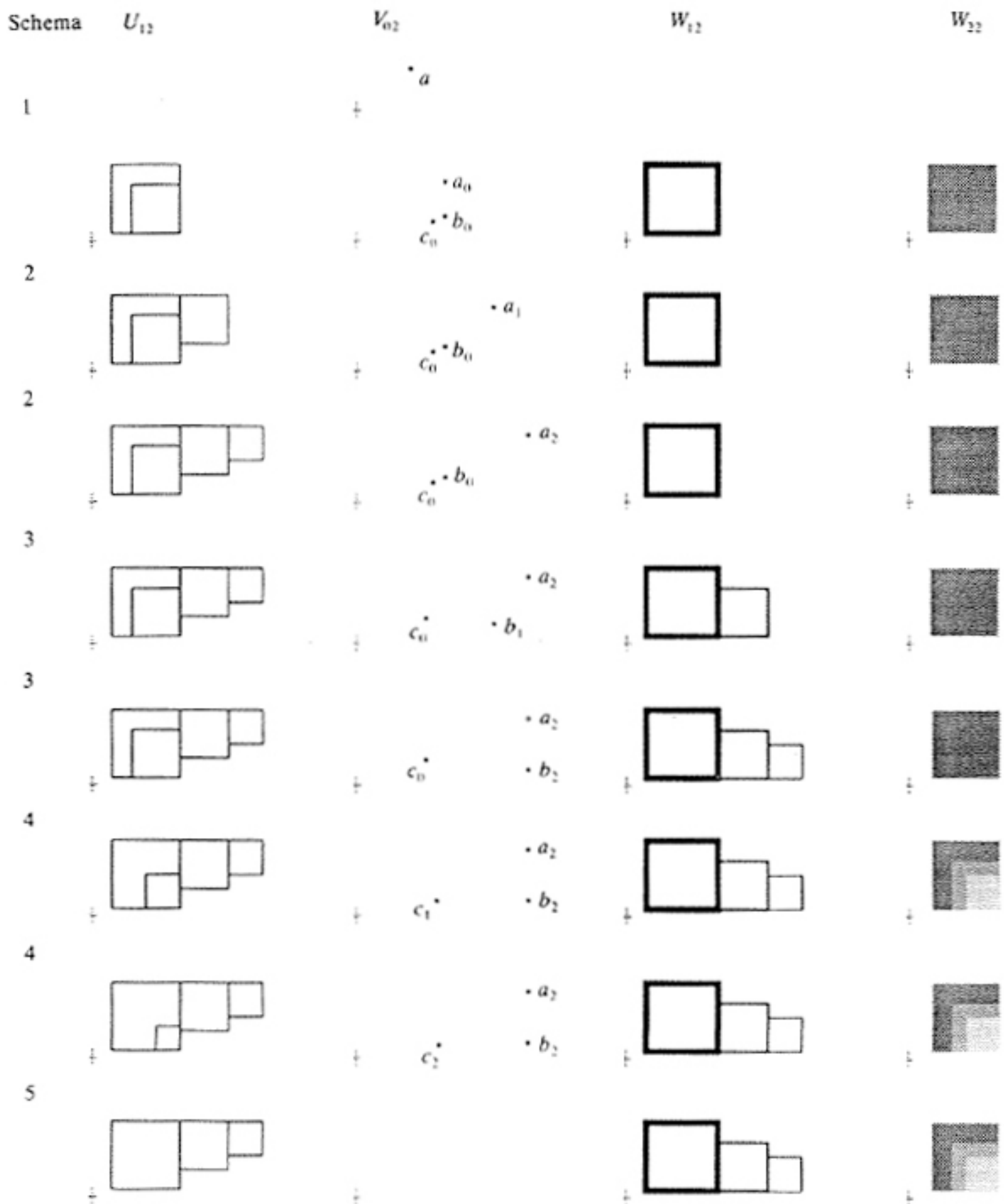


For $i \geq 0$:
$x = a_i$
$y = a_i + 1$,

For $i \geq 0$:
$x = b_i$
$x' = kr^i$
$y = b_{i+1}$
$y' = kr^{i+1}$,

For $i \geq 0$:
$x = c_i$
$x' = kr^i(1-r)$
$y = c_{i+1}$.

For $i \geq 0$:
$x = a_i$
$y = b_i$
$z = c_i$



Schema
U_{12}
V_{02}
W_{12}
W_{22}
1
2
2
3
3
4
4
5
a
a_0
b_0
c_0
a_1
a_2
b_1
b_2
c_1
c_2

a discussion of colors