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Skizze einer semiotischen zellulären Automatentheorie

1. Die kybernetische Automatentheorie (vgl. Gluschkow 1963) basiert bekanntlich auf abstrakten Automaten der Form (Mealy)

$Au = (A, X, Y, \delta, \lambda)$,

darin A die Menge der Zustände des Automaten Au, X die Menge der Eingabesignale und Y die Menge der Ausgabesignale von Au ist. δ ist die Überführungsfunktion und λ die Ergebnisfunktion.

Nun hatte Max Bense schon früh auf der Basis der Definition von Gluschkow die peircesche Zeichenrelation als „semiotischen Automaten" definiert (vgl. Bense 1971, S. 42 ff.)

$Z = (M, O, I, o, i)$,

darin M, O und I die bekannten „fundamentalen" Kategorien sind. o ist die Bezeichnungsfunktion

$o = (M \rightarrow O)$

und i ist die Bedeutungsfunktion

$i = (O \rightarrow U)$.

Wie Bense gezeigt hatte, besteht eine kybernetisch-semiotische Isomorphie

Au	≅	Z
A	≅	M
X	≅	O
Y	≅	I
δ	≅	o
λ	≅	i .

2. Die Theorie zellulärer Automaten stellt historisch natürlich eine Fortsetzung der klassischen Automatentheorie dar. Nach Wolfram (2002) wird ein zellulärer Automat definiert durch einen Zellularraum R, eine endliche Nachbarschaft

N, eine Zustandsmenge Q und eine lokale Überführungsfunktion δ. Da in der Semiotik vermöge Walther (1979, S. 79) gilt

$(M \rightarrow O) \circ (O \rightarrow I) = (o \rightarrow i)$,

können wir also definieren

$(o \rightarrow i) := \omega$

und bekommen damit folgende Isomorphien

CA	Z
R	M
N	O
Q	I
δ	ω .

3. Für die Semiotik wollen wir indessen nicht von der kanonischen triadischen Relation ausgehen, d.h. von einem semiotischen Automaten der Form

$$M \xrightarrow{o} O \xrightarrow{i} I,$$

sondern von einem, der die dreifache logische Deixis im Interpretantenbezug repräsentieren kann (vgl. Toth 2014)

$$\begin{tikzcd} M \arrow[r, "o"] & O \arrow[r, "i_1"] \arrow[dr, "I_2"] \arrow[ddr, "i_3"] & I_{Ich} \\ & & I_{Du} \\ & & I_{Er} \end{tikzcd}$$

d.h. wir gehen aus von einer semiotischen Relation der allgemeinen Form

$Z = (M, O, I_{Ich}, I_{Du}, I_{Er})$

und vereinbaren

■ := Erstheit

■ := Zweiheit

■ := Drittheit-Ich

■ := Drittheit-Du

■ := Drittheit-Er.

Jede pentadische semiotische Relation der Form

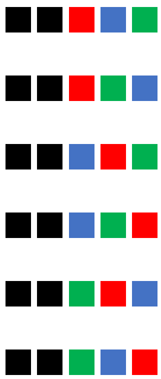
R = □□□□□

hat damit 5 Plätze, auf denen entweder alle 5, oder nur 4, 3, 2 oder 1 semiotischer Wert stehen darf. Ferner darf es keine leeren Plätze geben.

Dann gibt es genau die folgenden kombinatorischen Möglichkeiten, die wir in der Form von „semiotischen zellulären Automaten“ definieren wollen.

3.1. 5 Plätze, 1 Wert gleich (5! = 120)

3.2. 5 Plätze, 2 Werte gleich (858)



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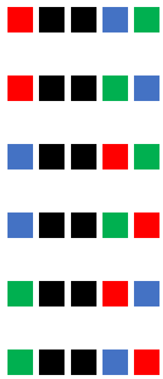

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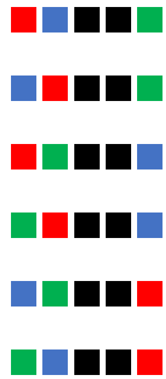

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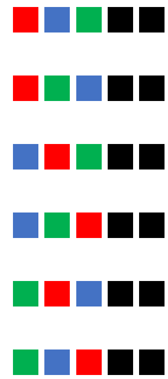

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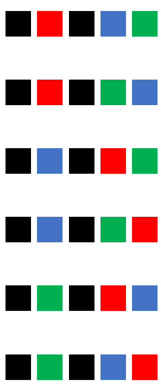

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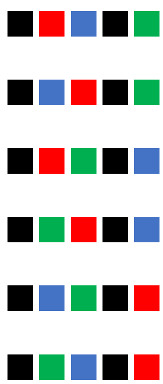

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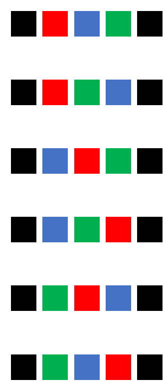

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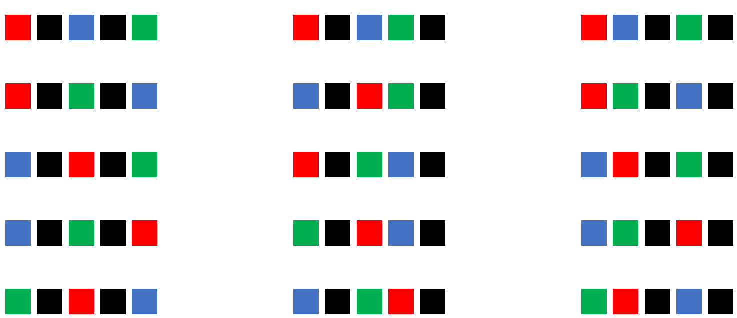
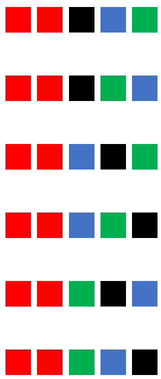


2: 4

2:5

3: 5

schwarz → rot



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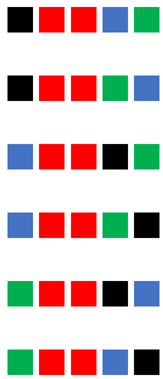

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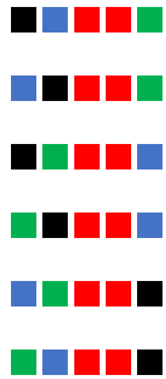

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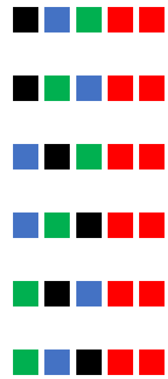

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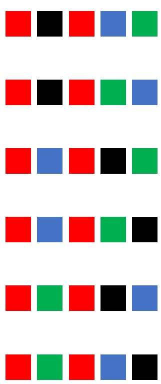

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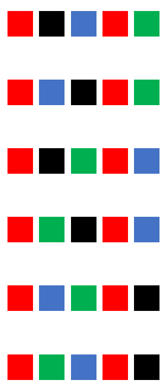

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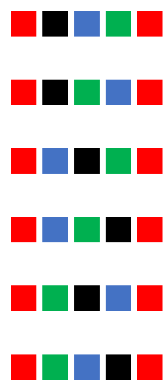

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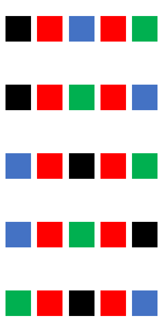

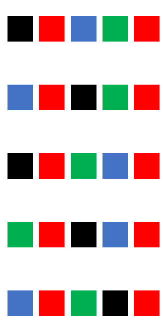

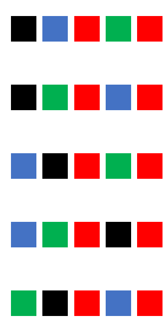

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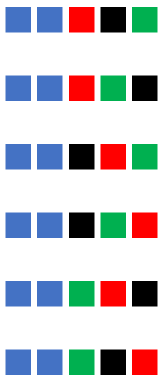
schwarz → blau



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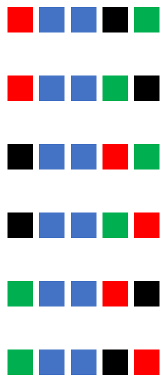

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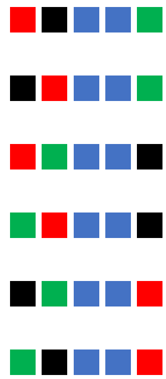

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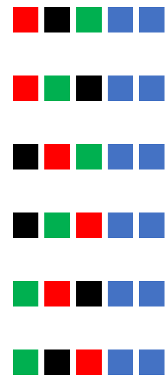

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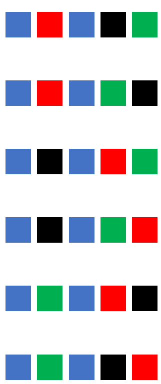

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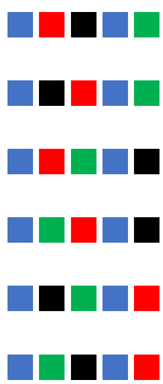

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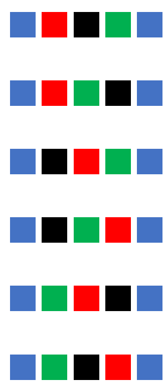

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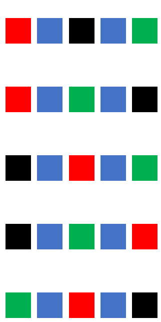
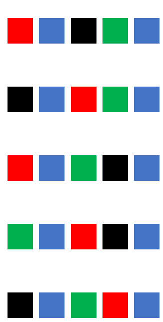
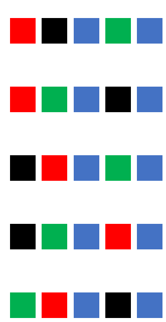


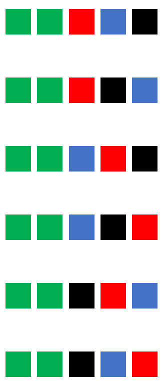
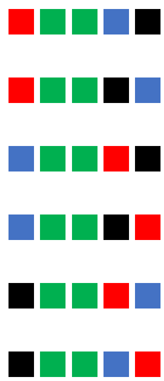
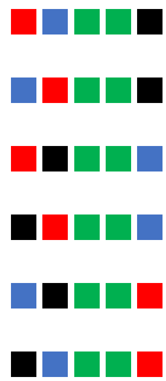
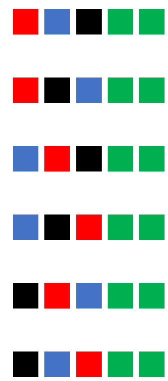




2: 4 2:5 3: 5

schwarz → grün

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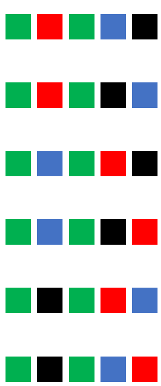 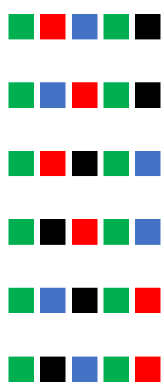 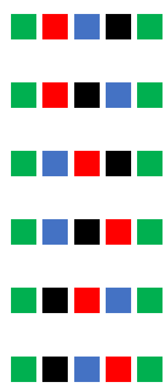

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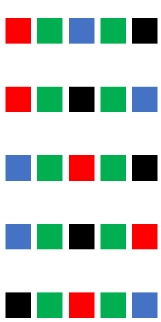
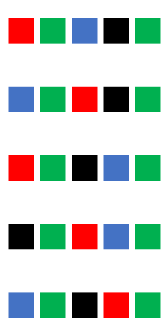
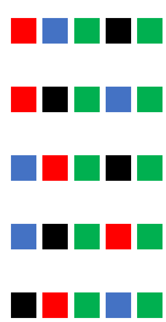
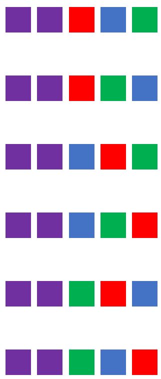
  

2: 4

2:5

3: 5

schwarz → violett



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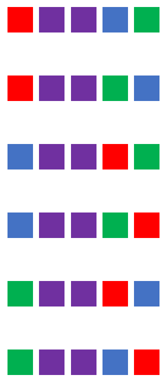

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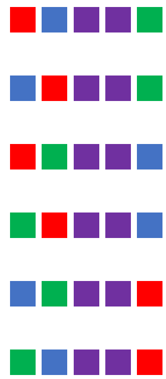

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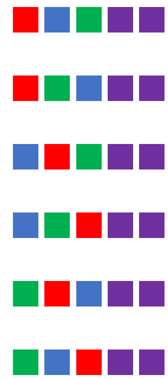

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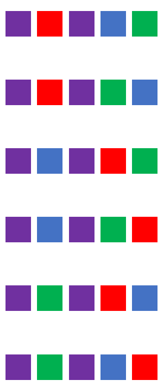

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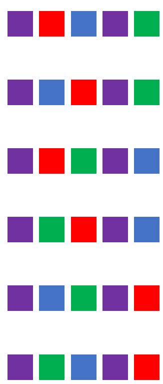

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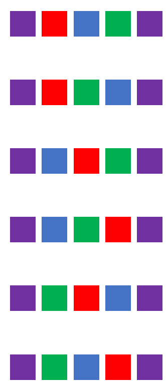

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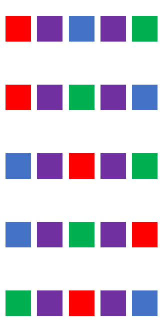

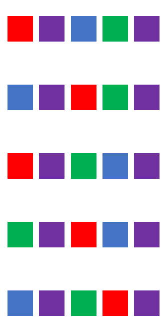

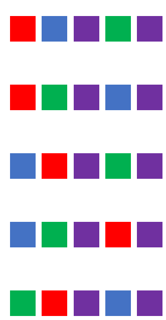

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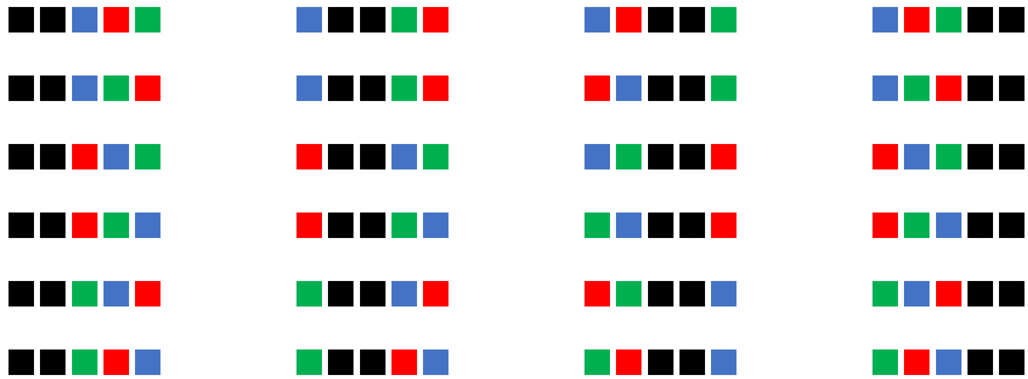
rot → blau



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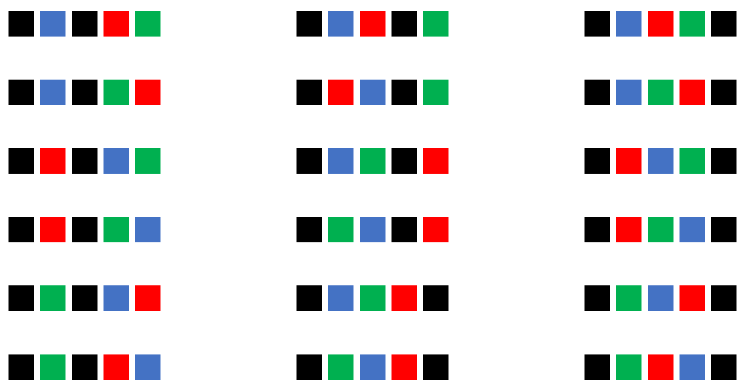

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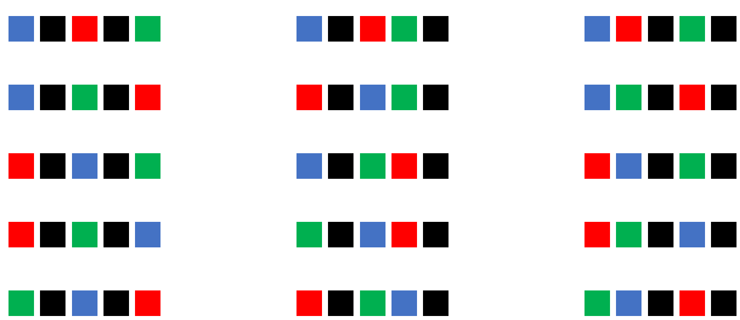
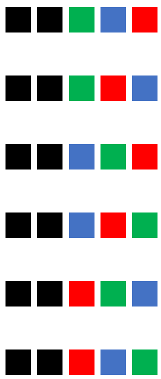
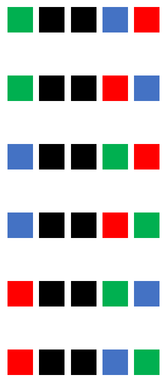
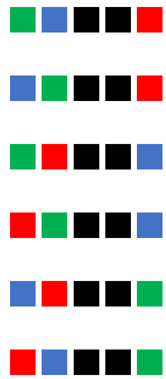
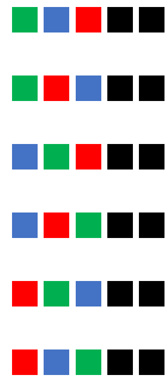


2: 4 2:5 3: 5

rot → grün

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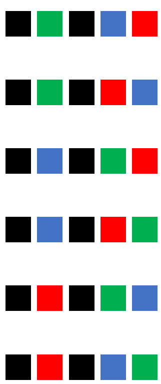 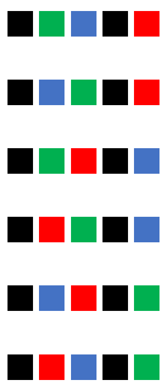 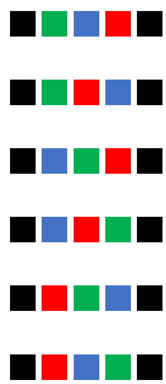

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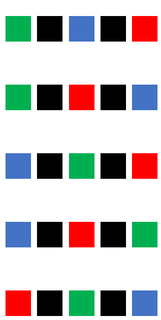 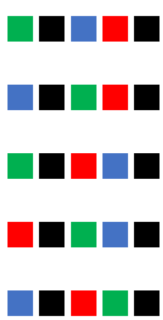 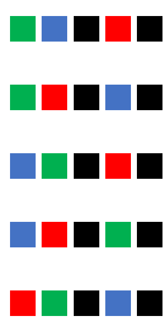

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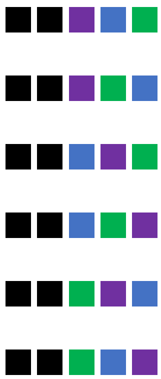
2:5

3: 5

rot → violett



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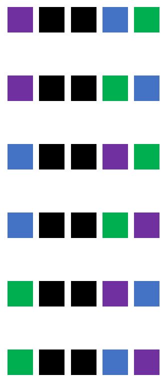

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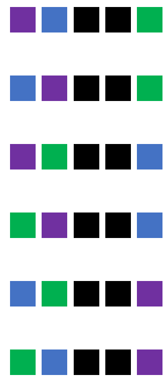

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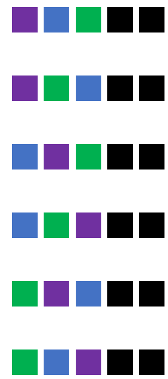

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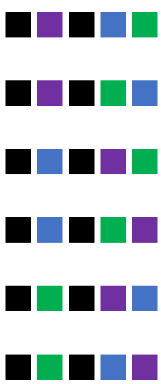

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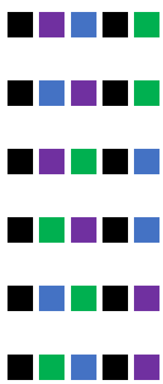

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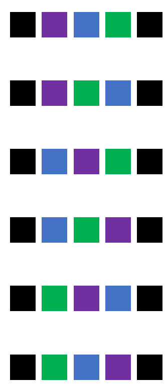

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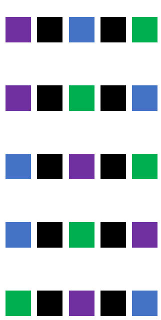
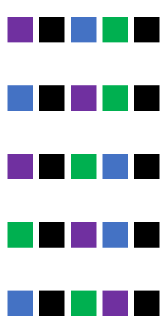
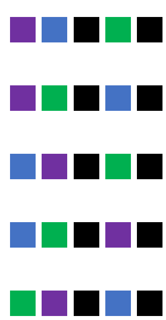




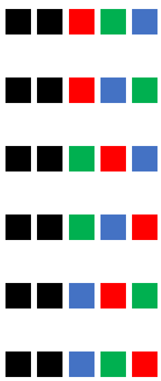


2: 4

2:5

3: 5

blau → grün



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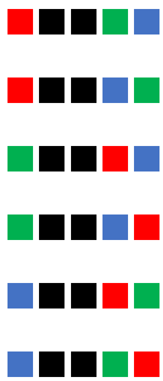

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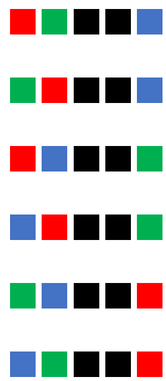

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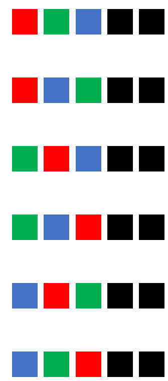

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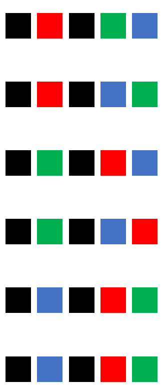

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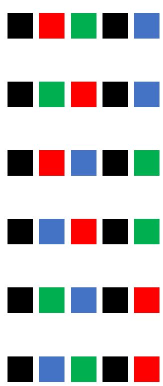

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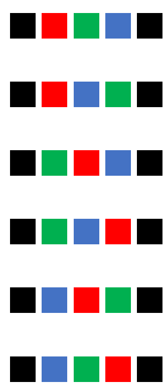

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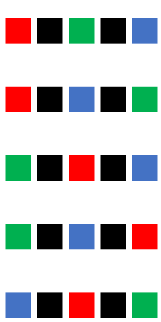
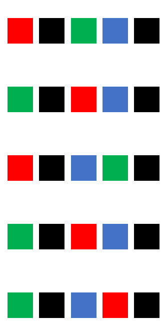
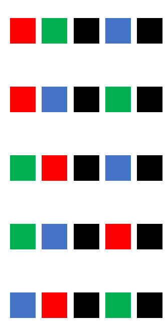




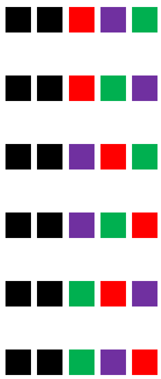


2: 4

2:5

3: 5

blau → violet



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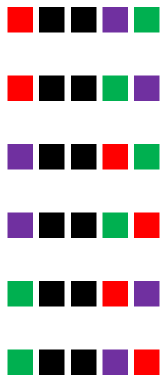

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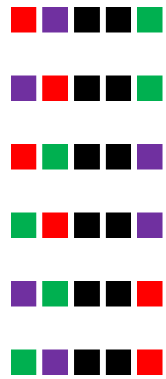

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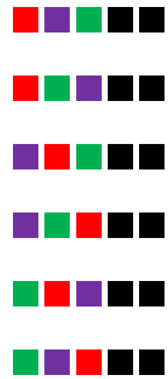

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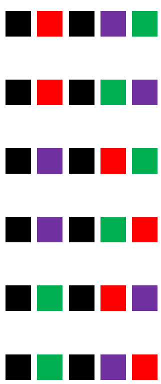

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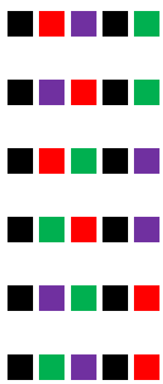

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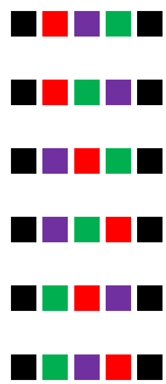

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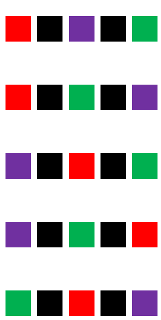
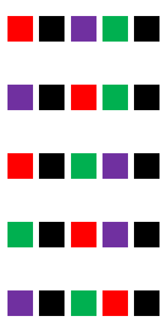
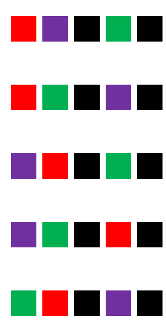




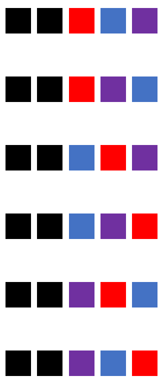


2: 4

2:5

3: 5

grün → violett



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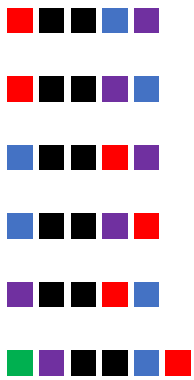

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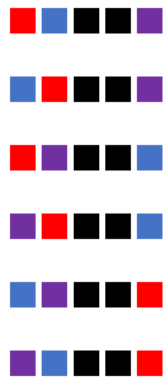

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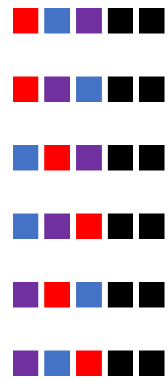

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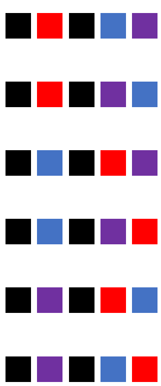

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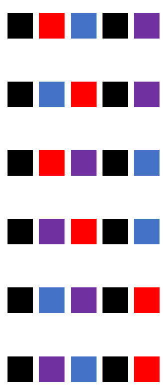

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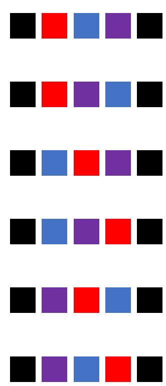

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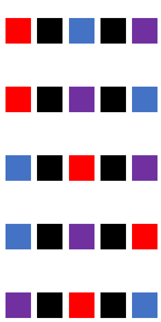
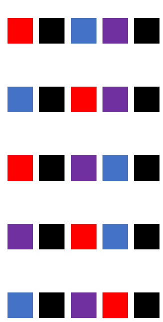
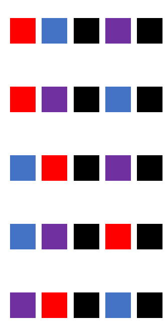


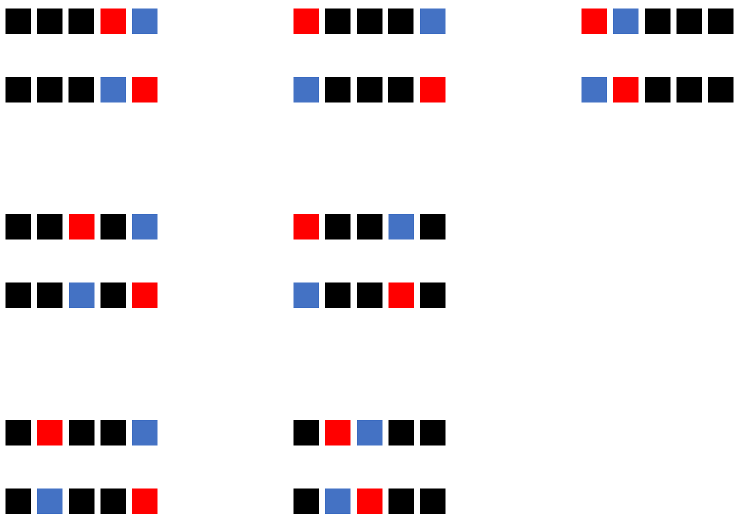




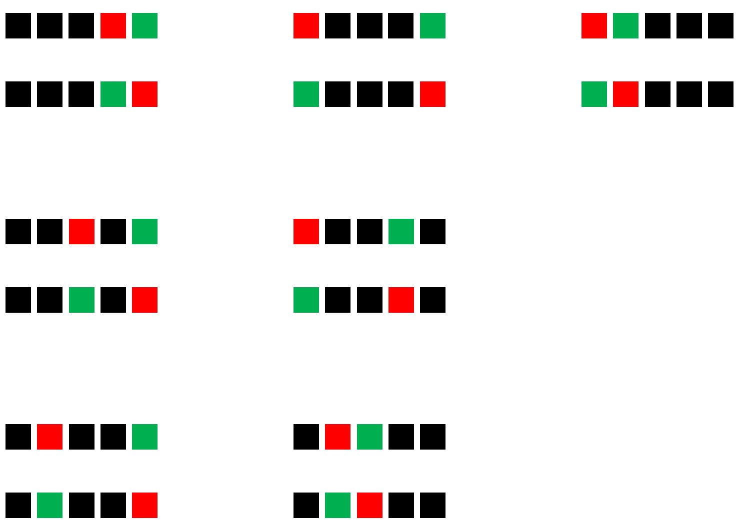
2: 4 2:5 3: 5

3.3. 5 Plätze, 3 Werte gleich (70)

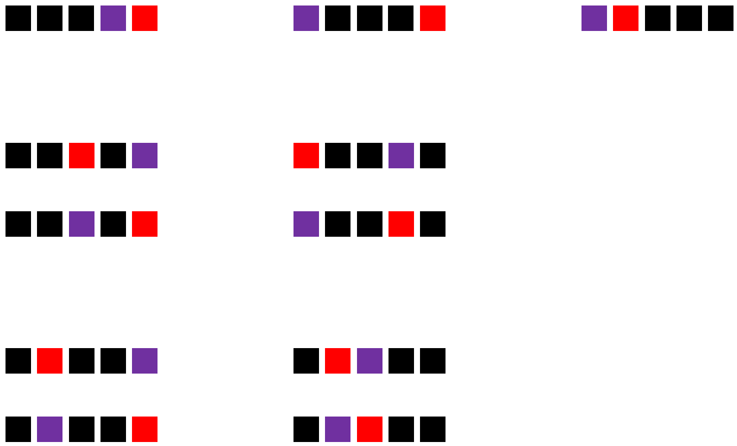
Rot und blau



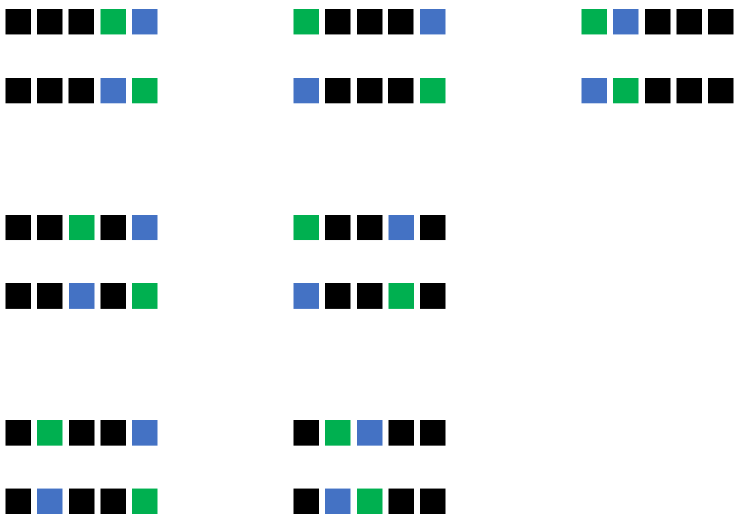
Rot und grün



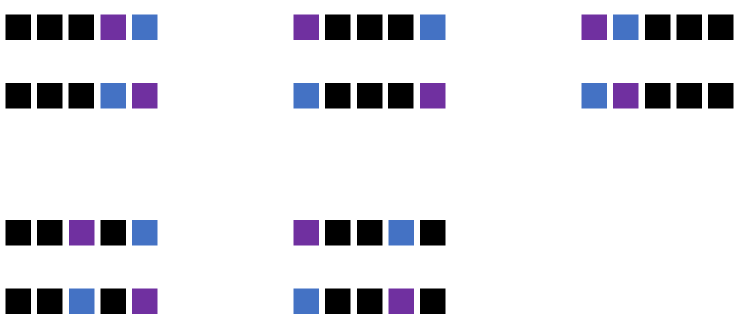
Rot und violett



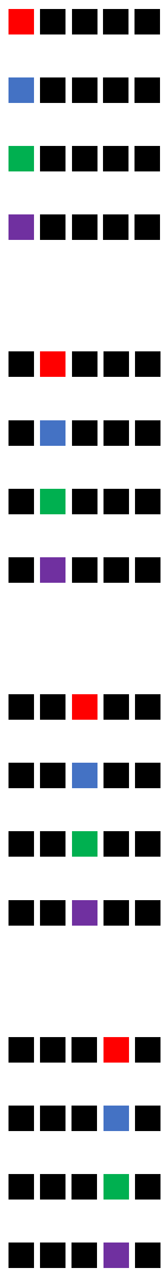
Blau und grün

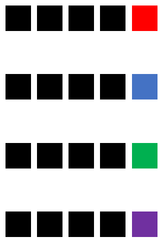


Blau und violett

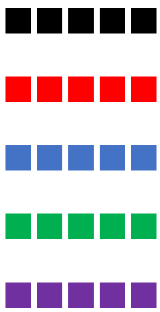


3.4. 5 Plätze, 4 Werte gleich (20)





3.5. 5 Plätze, 5 Werte gleich (5)



Insgesamt ergeben sich also 1073 semiotische zelluläre Automaten, oder besser gesagt TCA (totalistic cellular automata). Sie bilden das Gegenstück zu der von Kaehr (vgl. Kaehr 2013) definierten „Morphosphäre". Möchte man die semiotische Morphosphäre in der Form von TCA darstellen, genügt es, die 1073 TCA mittels des Normalformoperators auf Trito-Normalformen zu reduzieren (vgl. dazu ebenfalls Kaehr 2013, der deswegen die asymmetrischen Palindrome als konstitutiv für die Morphosphäre, die symmetrischen Palindrome hingegen als konstitutiv für die Semiospäre herausgestellt hatte[1]). Zu Vorarbeiten zu einer, allerdings auf der triadisch-trichotomischen und der tetradisch-tetratomischen Semiotik basierenden, Theorie der semiotischen Morphosphäre vgl. Toth (2018a-p).

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[1] Dieses Ergebnis deckt sich mit der Entdeckung Walthers, daß das sog. peircesche Zehnersystem sich als "determinantensymmetrisches Dualitätssystem" darstellen läßt (vgl. Walther 1982) und der Bestimmung der "eigenrealen", d.h. dualinvarianten (und damit symmetrisch-palindromischen) Zeichenklasse des Zeichens und der Zahl durch Bense (vgl. Bense 1992).

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Key Words

Cellulular automata, automata theory, morphosphere, semiosphere, semiotics, poly-contextural systems

Summary

After Kaehrs groundbreaking studies in introducing morpho-CA and establishing a morphosphere for poly-contextural systems, the present article

presents, for the first time, an attempt at laying the bases of a formal theory of the semiosphere, based on semiotics TCA („semio-CA“).

20.12.2018