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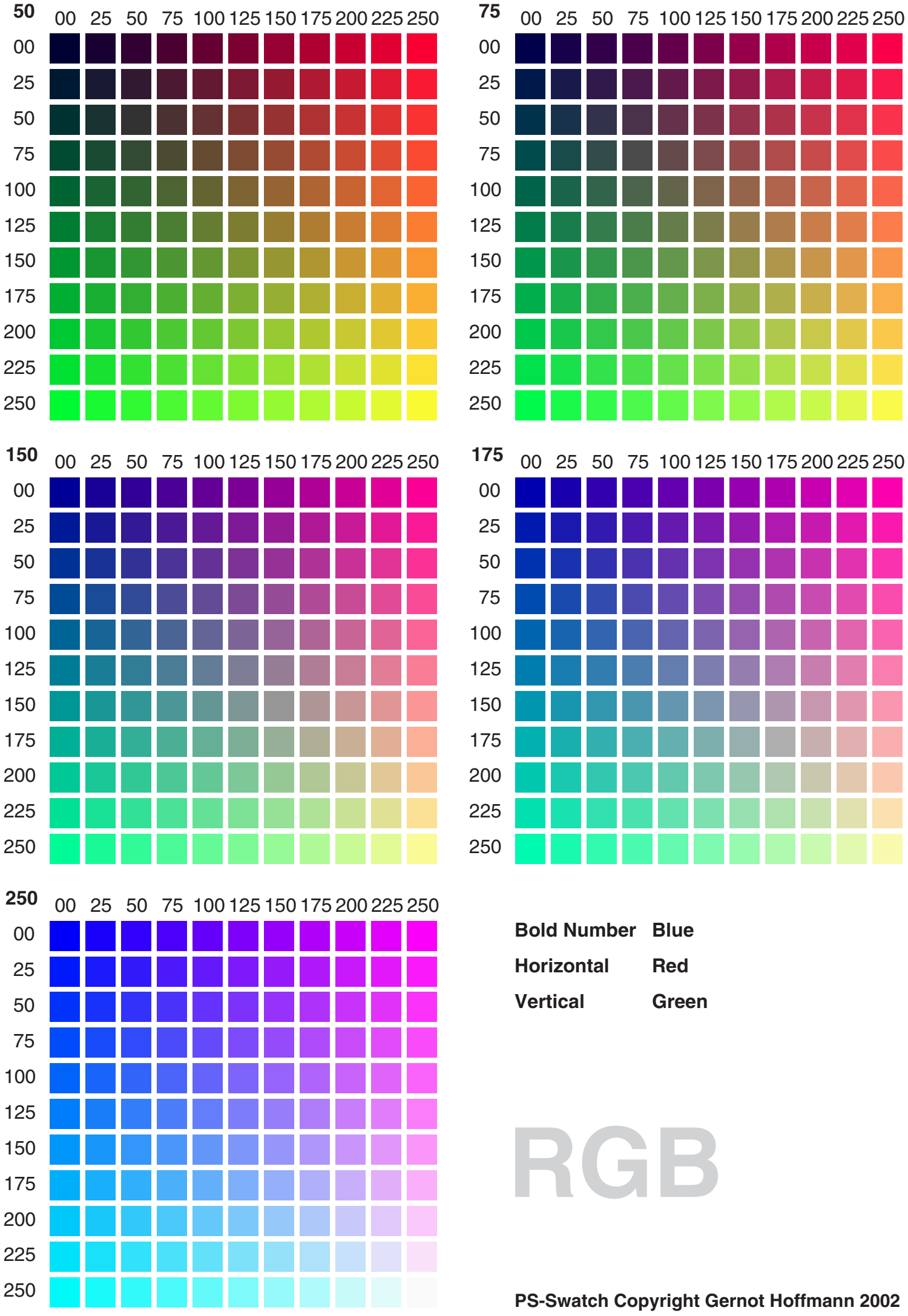
Balanced Palettes

Contents

Introduction

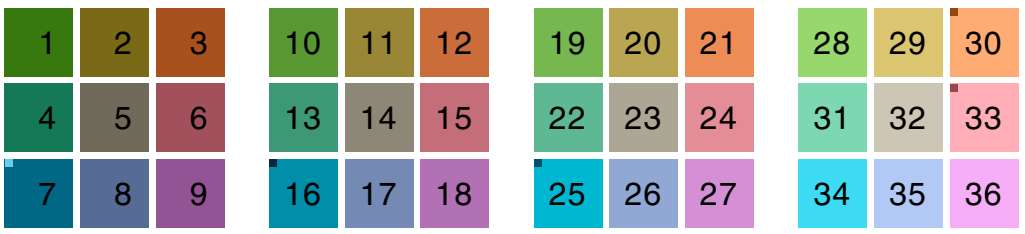
Equally spaced RGB values do not deliver perceptually balanced palettes. This can be seen in a selection of RGB values [1], especially for the greens in the last rows.



Balanced palettes, e.g. for maps, can be constructed by taking the values in CIELab [2] in a regular grid. Some are out of gamut in the standard color space sRGB. These are marked by a dot and manipulated for better appearance.
Page 6 shows colors by steps of hue for maximal saturation for three values L*.

Palette

sRGB



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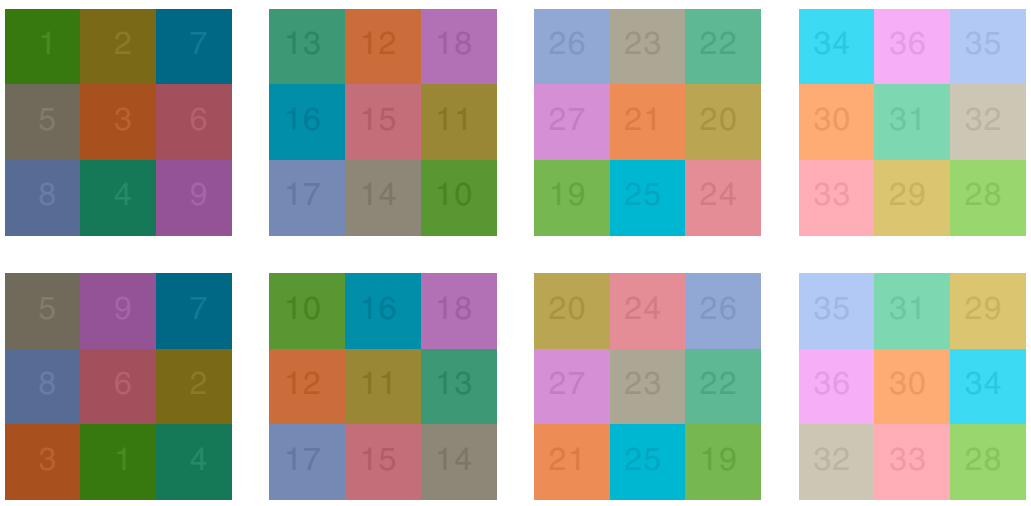
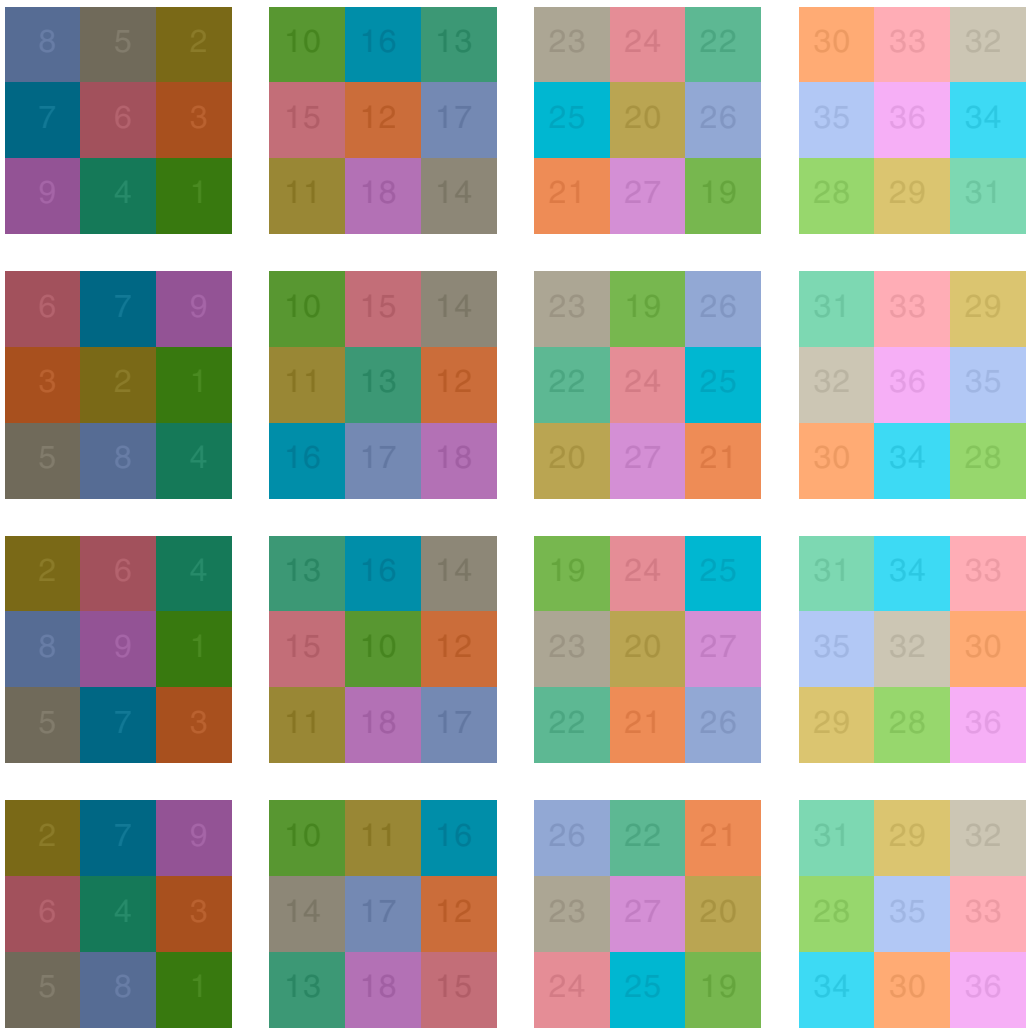
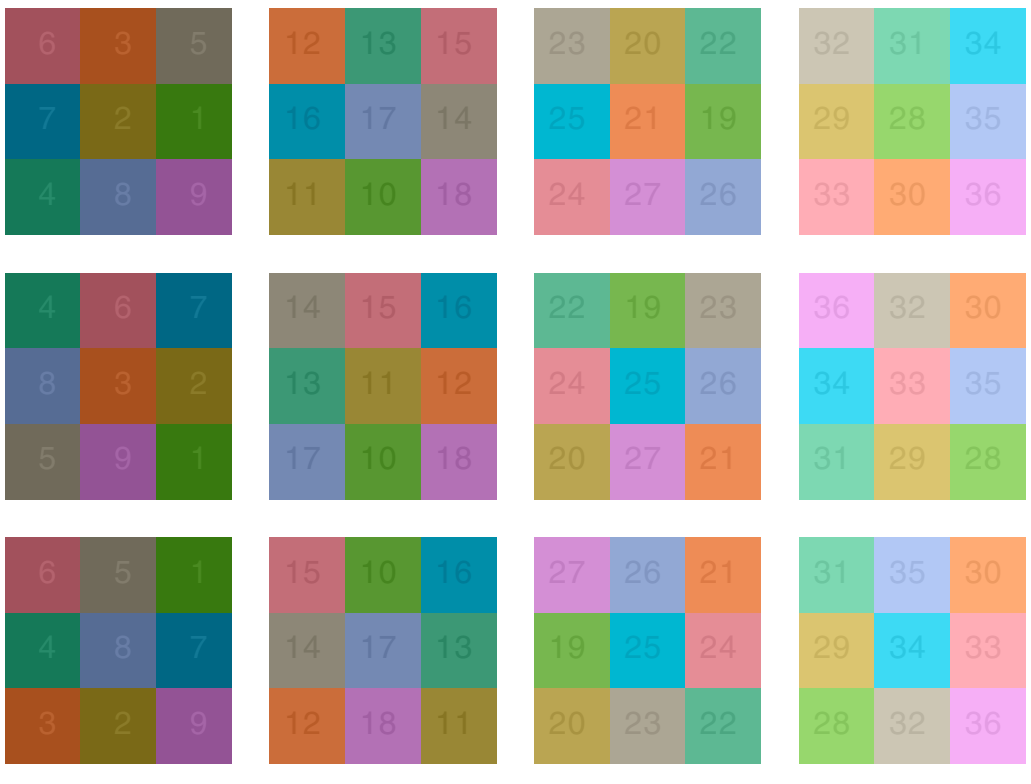
Normalized parameters

amin/amax	-0.35	0.35
bmin/bmax	-0.25	0.45
Lmin/Lmax	0.45	0.80

Random Combinations



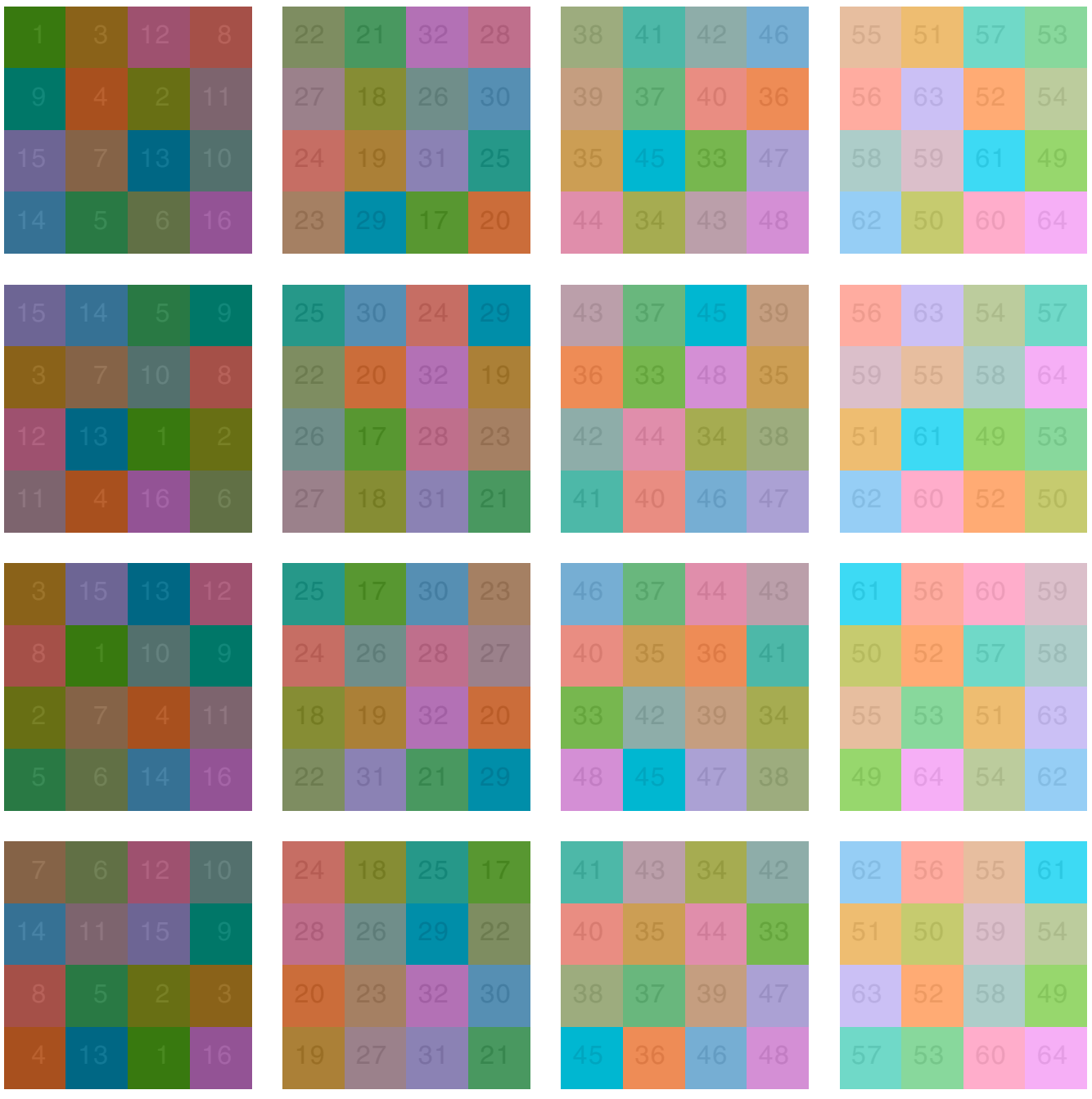




No	R	G	B
1	55	120	15
2	121	104	22
3	167	79	29
4	20	120	87
5	111	105	89
6	161	80	91
7	0	102	131
8	85	107	147
9	146	82	148
10	87	150	48
11	152	134	52
12	202	108	57
13	59	151	116
14	140	135	118
15	194	110	119
16	0	141	168
17	115	136	178
18	178	112	179
19	118	182	78
20	185	164	81
21	237	139	85
22	92	183	146
23	171	165	148
24	228	140	149
25	0	182	207
26	145	167	211
27	211	142	212
28	150	214	108
29	218	196	111
30	254	170	115
31	125	215	177
32	203	197	179
33	254	172	181
34	61	217	243
35	177	199	244
36	245	174	245

Palette

Random Combinations



sRGB 4

Normalized parameters

amin/amax	-0.35	0.35
bmin/bmax	-0.25	0.45
Lmin/Lmax	0.45	0.80

No	R	G	B
1	55	120	15
2	103	110	19
3	137	97	24
4	167	79	29
5	39	120	67
6	96	111	68
7	132	98	70
8	164	79	72
9	0	118	103
10	82	111	108
11	124	99	109
12	157	80	110
13	0	102	131
14	53	112	147
15	108	100	147
16	146	82	148
17	87	150	48
18	133	140	51
19	170	126	54
20	202	108	57
21	72	151	95
22	125	140	96
23	164	127	98
24	197	109	99
25	37	151	137
26	111	141	137
27	154	128	138
28	190	110	139
29	0	141	168
30	85	142	178
31	138	129	179
32	178	112	179
33	118	182	78
34	165	171	80
35	203	157	83
36	237	139	85
37	103	182	124
38	156	171	126
39	196	157	127
40	232	140	129
41	76	183	167
42	141	172	168
43	186	158	169
44	223	141	170
45	0	182	207
46	117	173	210
47	170	160	211
48	211	142	212
49	150	214	108
50	197	203	110
51	237	188	112
52	254	170	115
53	135	215	155
54	187	203	156
55	229	189	158
56	254	171	159
57	111	216	199
58	172	204	200
59	218	190	201
60	254	172	202
61	61	217	243
62	149	205	243
63	202	191	244
64	245	174	245

Palette

sRGB

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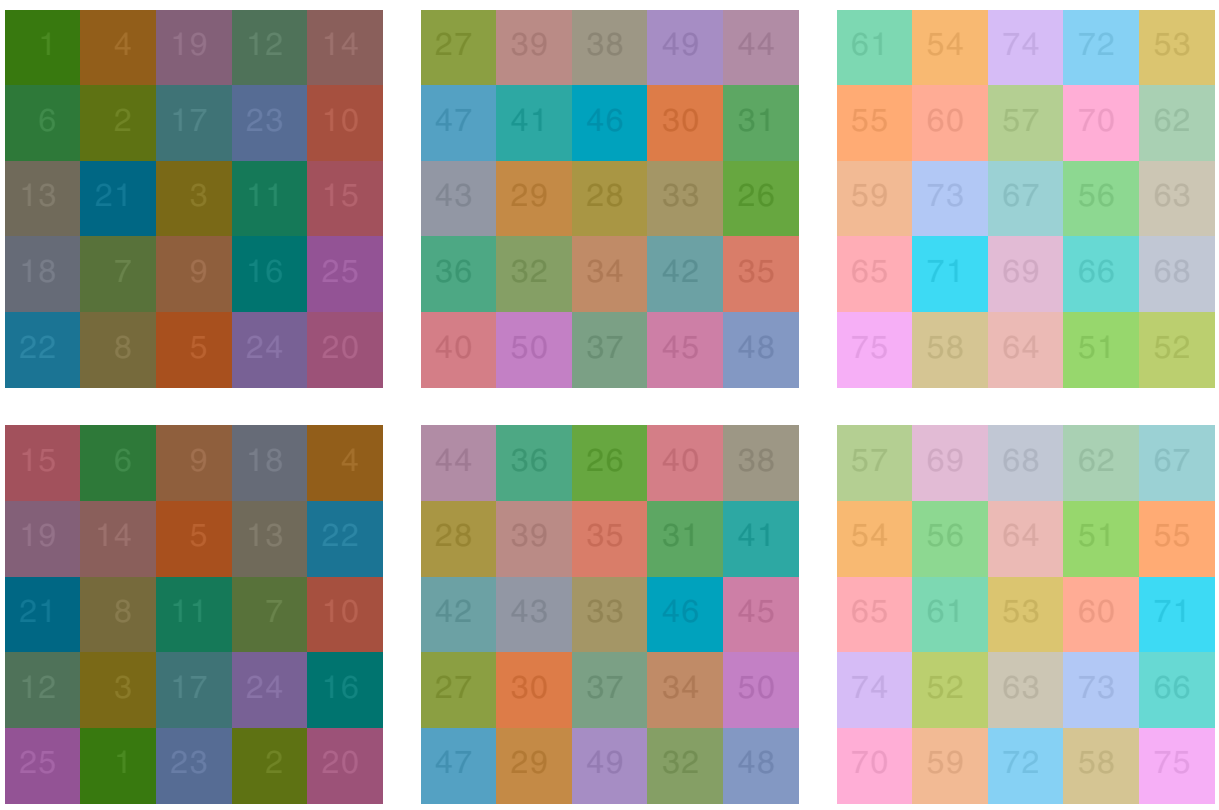
Normalized parameters

amin/amax	-0.35	0.35
bmin/bmax	-0.25	0.45
Lmin/Lmax	0.45	0.80

Random Combinations



No	R	G	B
1	55	120	15
2	93	113	18
3	121	104	22
4	145	93	25
5	167	79	29
6	45	120	56
7	87	113	57
8	117	105	59
9	142	94	60
10	165	79	62
11	20	120	87
12	78	114	88
13	111	105	89
14	137	94	90
15	161	80	91
16	0	114	110
17	62	114	117
18	101	106	118
19	130	95	119
20	155	81	119
21	0	102	131
22	26	115	147
23	85	107	147
24	119	96	148
25	146	82	148
26	102	166	63
27	138	158	65
28	168	149	67
29	195	137	69
30	220	124	71
31	92	166	99
32	132	158	100
33	163	149	101
34	191	138	102
35	216	124	103
36	76	167	131
37	122	159	132
38	156	150	132
39	185	139	133
40	211	125	134
41	44	167	162
42	107	160	163
43	145	150	163
44	176	139	164
45	204	126	165
46	0	161	188
47	83	160	194
48	130	151	194
49	165	140	195
50	194	127	196
51	150	214	108
52	186	206	110
53	218	196	111
54	247	184	113
55	254	170	115
56	140	215	144
57	179	206	145
58	212	196	146
59	241	185	147
60	254	171	148
61	125	215	177
62	168	207	178
63	203	197	179
64	234	185	180
65	254	172	181
66	102	216	210
67	154	207	211
68	192	198	211
69	225	186	212
70	254	173	213
71	61	217	243
72	133	208	243
73	177	199	244
74	213	187	244
75	245	174	245

Palette

sRGB

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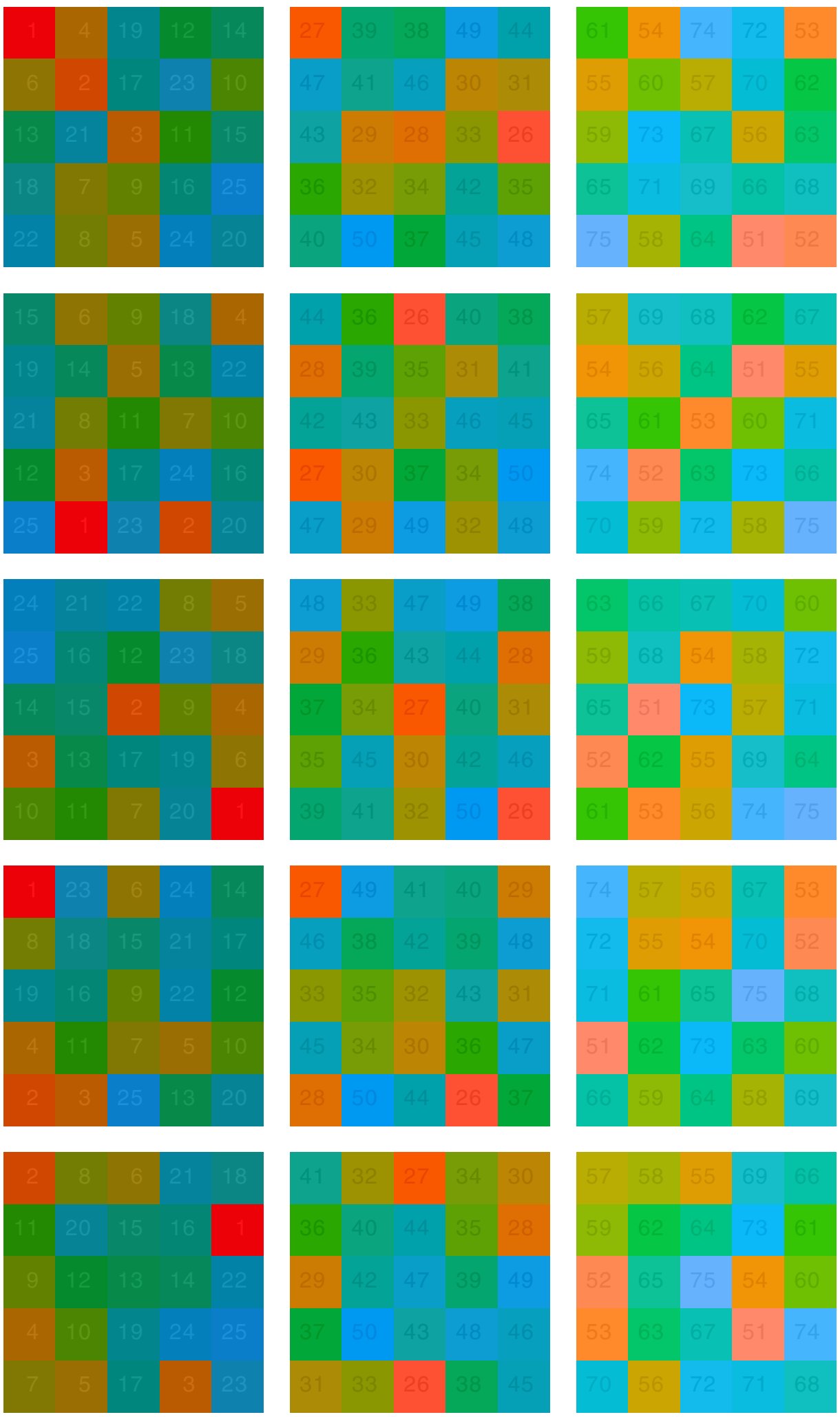
Random Combinations



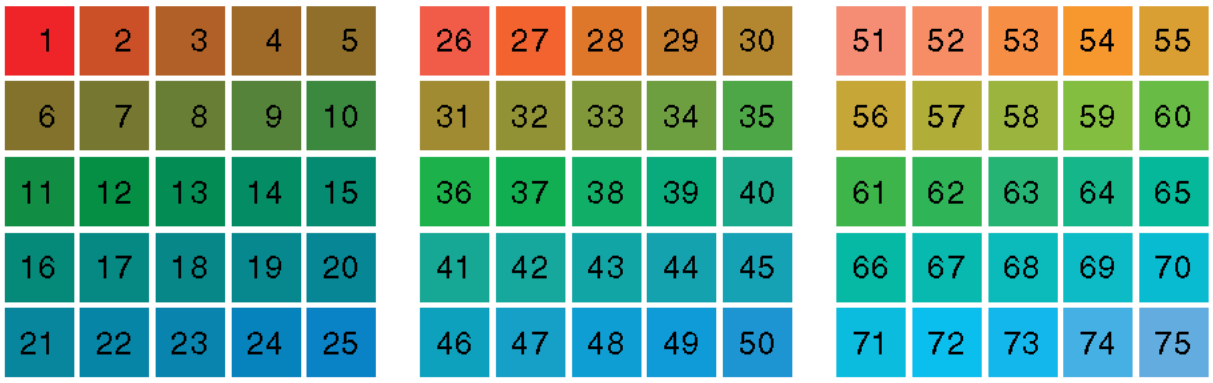
The palette was created in CIELab for 25 Hue angles H=40°...270° and 3 Lightness values L*=50,60,70. The Saturation (radius in the plane a*,b*) was increased until the sRGB values were just at the gamut boundary or a little below.

Normalized parameters

Hmin/Hmax	40.00	270.00
Lmin/Lmax	0.50	0.70

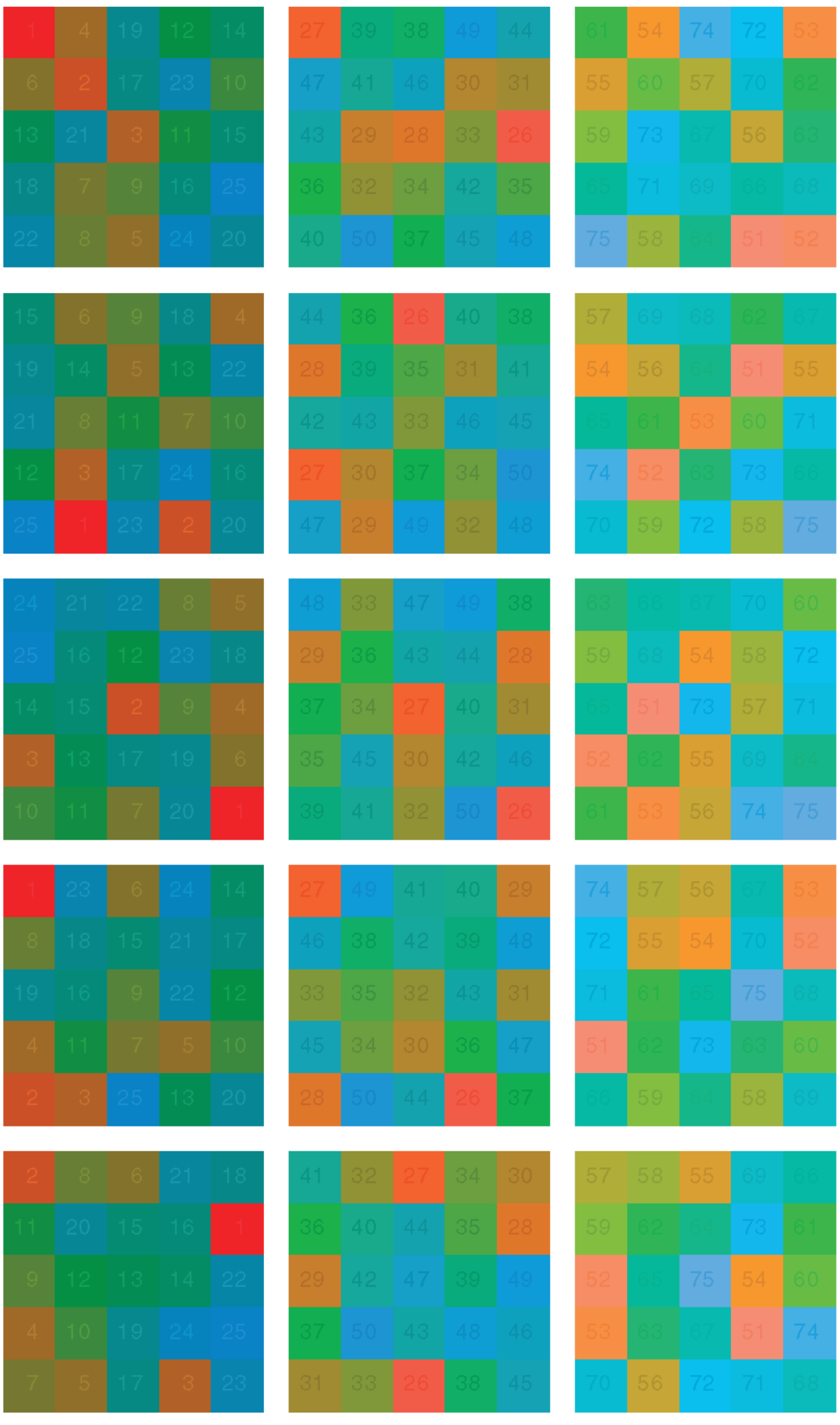
No	R	G	B
1	234	1	7
2	206	70	0
3	185	90	1
4	169	101	0
5	154	109	4
6	141	114	3
7	128	119	4
8	114	124	3
9	97	128	0
10	75	132	2
11	34	136	2
12	6	137	45
13	6	136	72
14	6	135	90
15	8	135	103
16	3	134	114
17	0	133	124
18	12	132	132
19	3	132	140
20	6	131	148
21	5	130	156
22	1	129	165
23	15	128	173
24	3	127	186
25	10	125	199
26	254	79	49
27	248	87	1
28	223	111	3
29	204	123	3
30	187	132	3
31	171	139	6
32	156	145	1
33	139	150	0
34	119	155	5
35	93	160	5
36	42	166	1
37	1	166	56
38	5	165	88
39	4	164	110
40	11	163	126
41	14	162	139
42	3	162	151
43	14	161	161
44	0	160	171
45	5	159	180
46	7	158	189
47	8	157	199
48	14	156	210
49	13	154	224
50	0	152	241
51	253	136	106
52	254	136	82
53	254	138	43
54	240	147	6
55	221	157	3
56	203	165	3
57	184	172	4
58	164	178	4
59	141	184	5
60	110	190	3
61	53	196	5
62	6	197	68
63	3	196	105
64	0	195	130
65	13	193	150
66	5	192	165
67	9	191	178
68	15	190	190
69	21	189	201
70	4	188	212
71	10	187	223
72	17	186	235
73	11	184	248
74	68	181	253
75	101	177	252

Palette



The image from the previous page comes here converted by Photoshop7 in CMYK.
Source sRGB, destination Euroscale Coated v2.

Random Combinations



In order to show this doc correctly by Acrobat, some color management settings are required.
This may work only for the professional version.

Edit/
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General/
Color Management

RGB: sRGB

CMYK: Euroscale Coated

Gray: Gray Gamma 2.2

View/
Proof Colors: Off

References

[1] G.Hoffmann
CMYK and RGB Swatchbook
http://docs-hoffmann.de/swatch22112002.pdf

[2] G.Hoffmann
CIELab Colorspace
http://docs-hoffmann.de/cielab03022003.pdf

This doc:
http://docs-hoffmann.de/palette30082003.pdf

Note

The appearance of adjacent color patches
in Acrobat Reader can be improved by
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