Vizualizace dat

Barva ve vizualizaci dat

13. 10. 2022

vnímání změn hodnot

Weberův zákon

Stevensův zákon

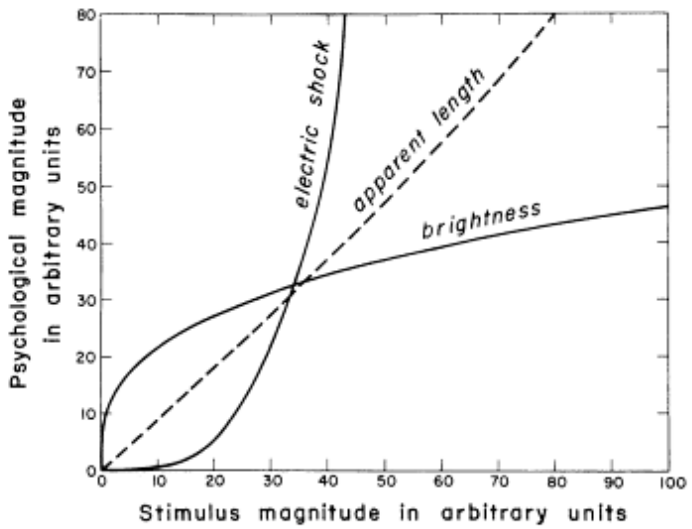
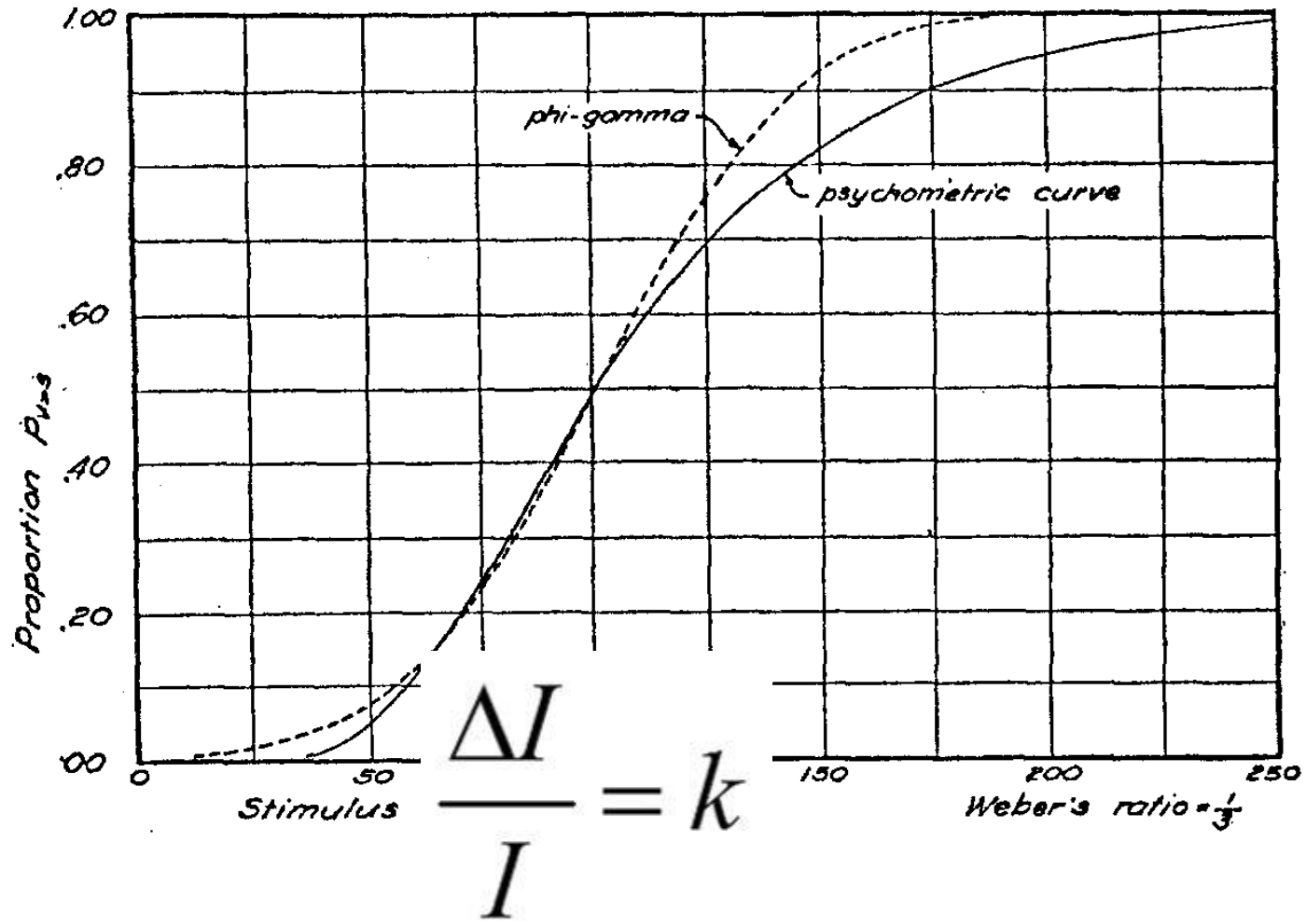
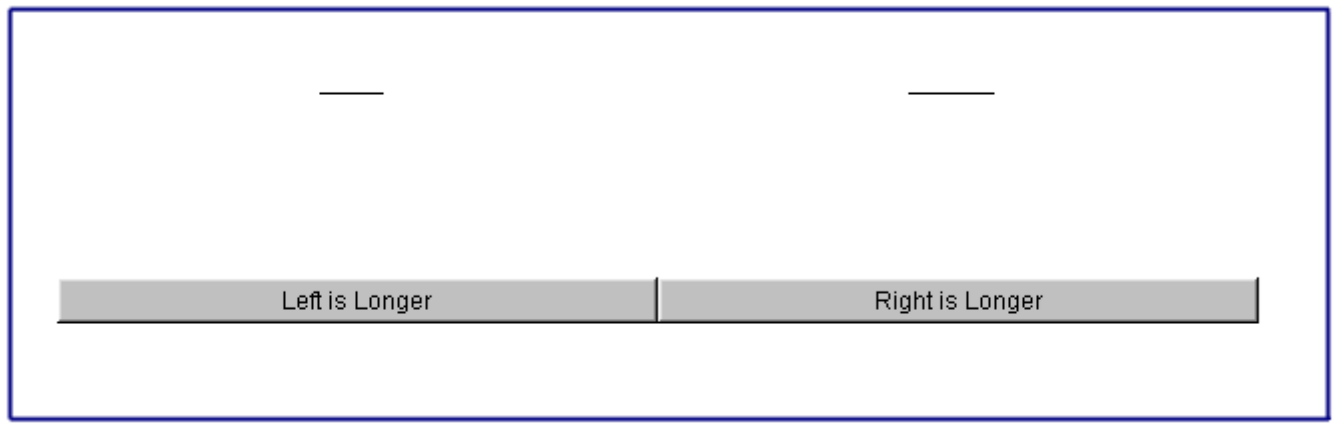
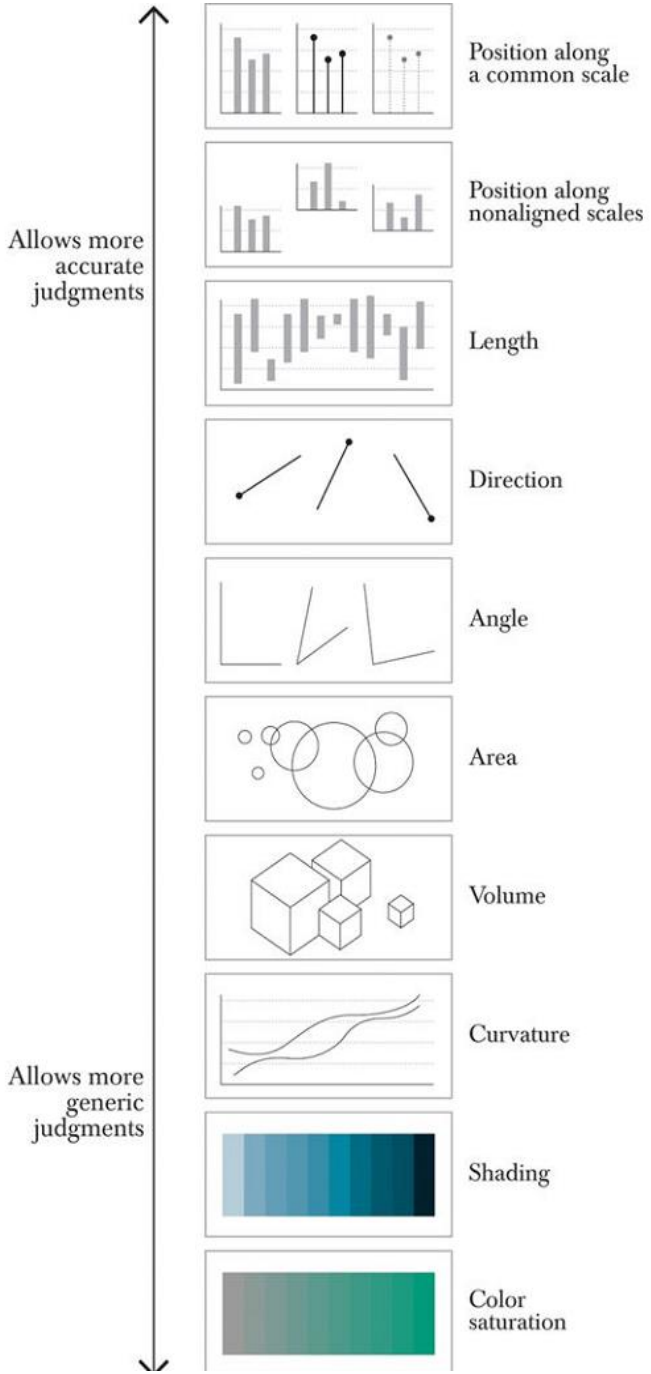


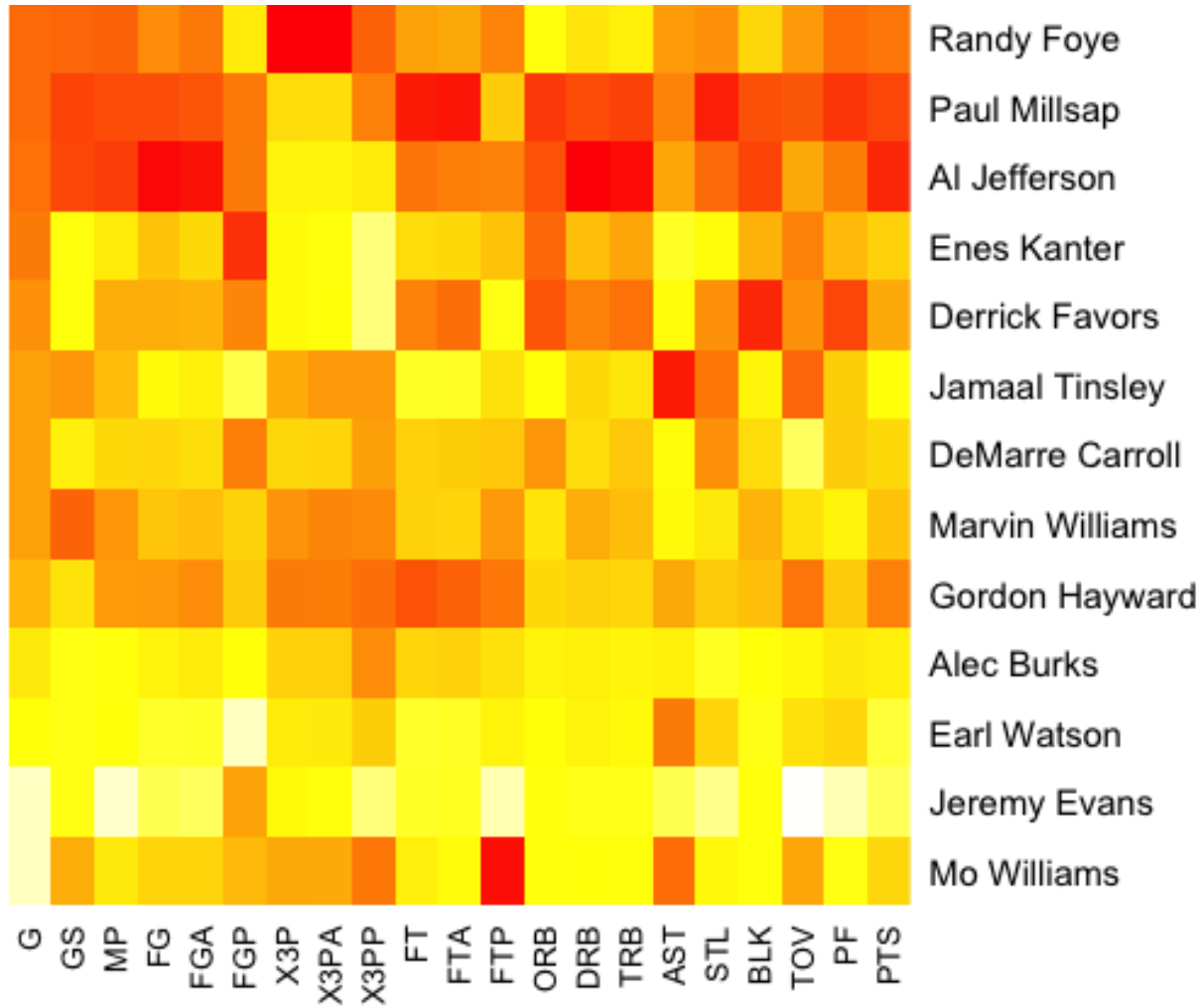
Fig. 5. The apparent magnitudes of electric shock, length, and brightness follow different curves of growth, because their power law exponents are 3.5, 1.1, and 0.33, respectively. Note how the curve is concave upward or downward, depending on whether the exponent is greater or less than 1.0. The power function for apparent length is almost straight in these linear coordinates because its exponent is close to 1.0. The units of the scales have been chosen arbitrarily in order to show the relative form of the curves on a single graph. (From Stevens 1961.)




Left is Longer
Right is Longer

Vizuální proměnné dle kvantitativní efektivity




Randy Foye
Paul Millsap
Al Jefferson
Enes Kanter
Derrick Favors
Jamaal Tinsley
DeMarre Carroll
Marvin Williams
Gordon Hayward
Alec Burks
Earl Watson
Jeremy Evans
Mo Williams
G
GS
MP
FG
FGA
FGP
X3P
X3PA
X3PP
FT
FTA
FTP
ORB
DRB
TRB
AST
STL
BLK
TOV
PF
PTS

vnímání barev

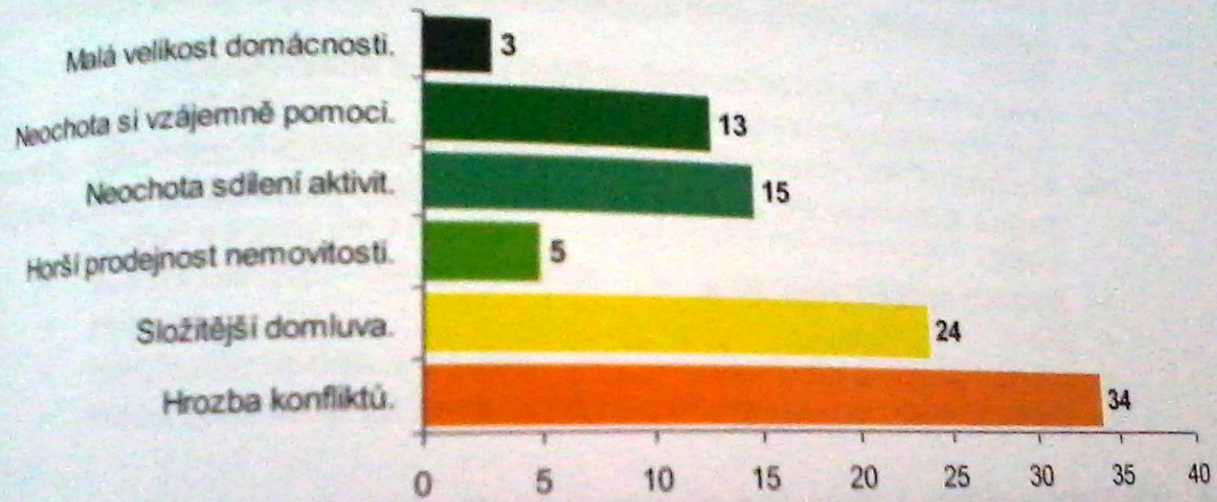
Barva ve vizualizaci

Záměrné využití k nesení významu
Kódování hodnot/kategorií

Propojení grafiky s identitou značky

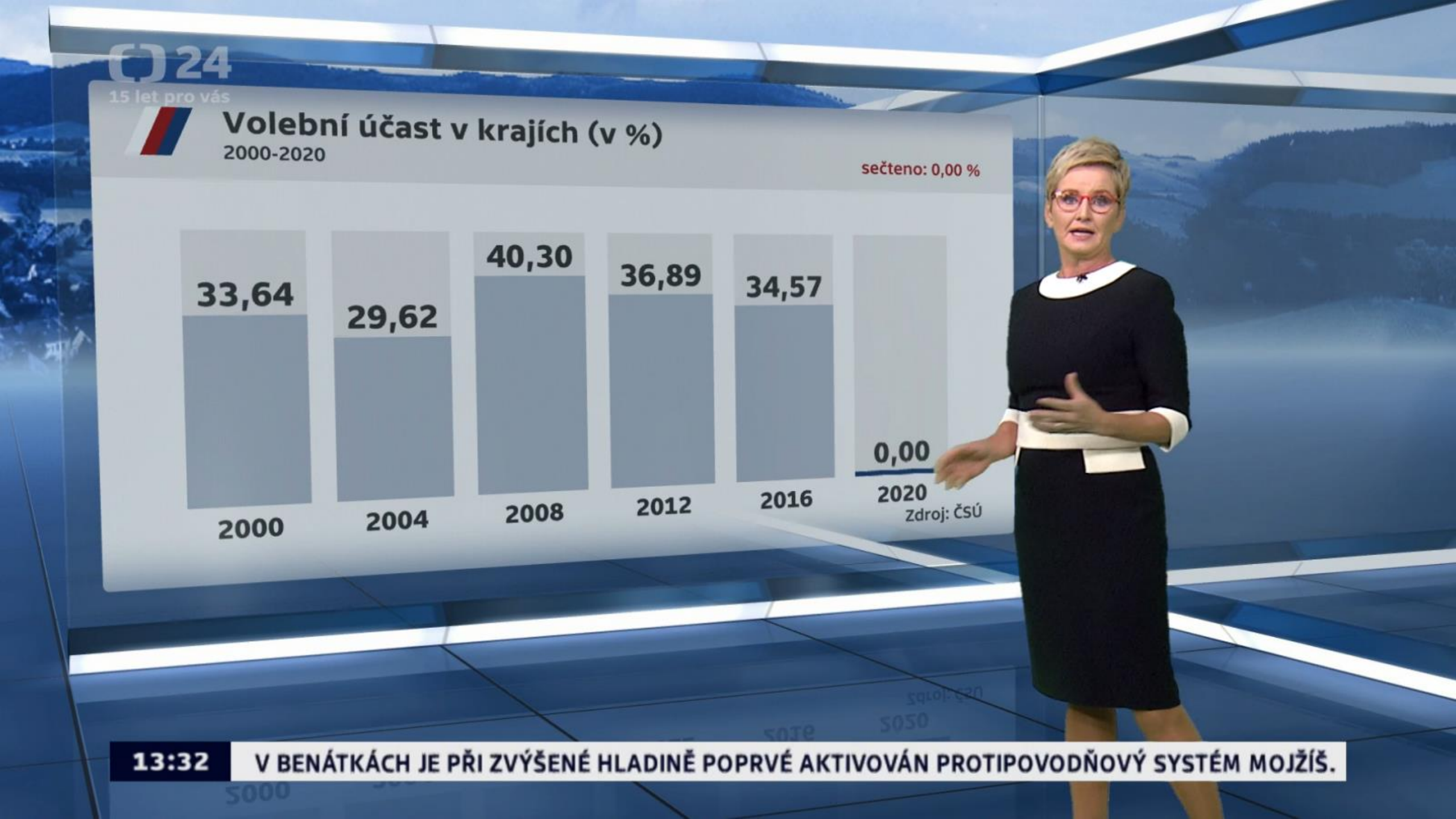
Nezáměrné asociace

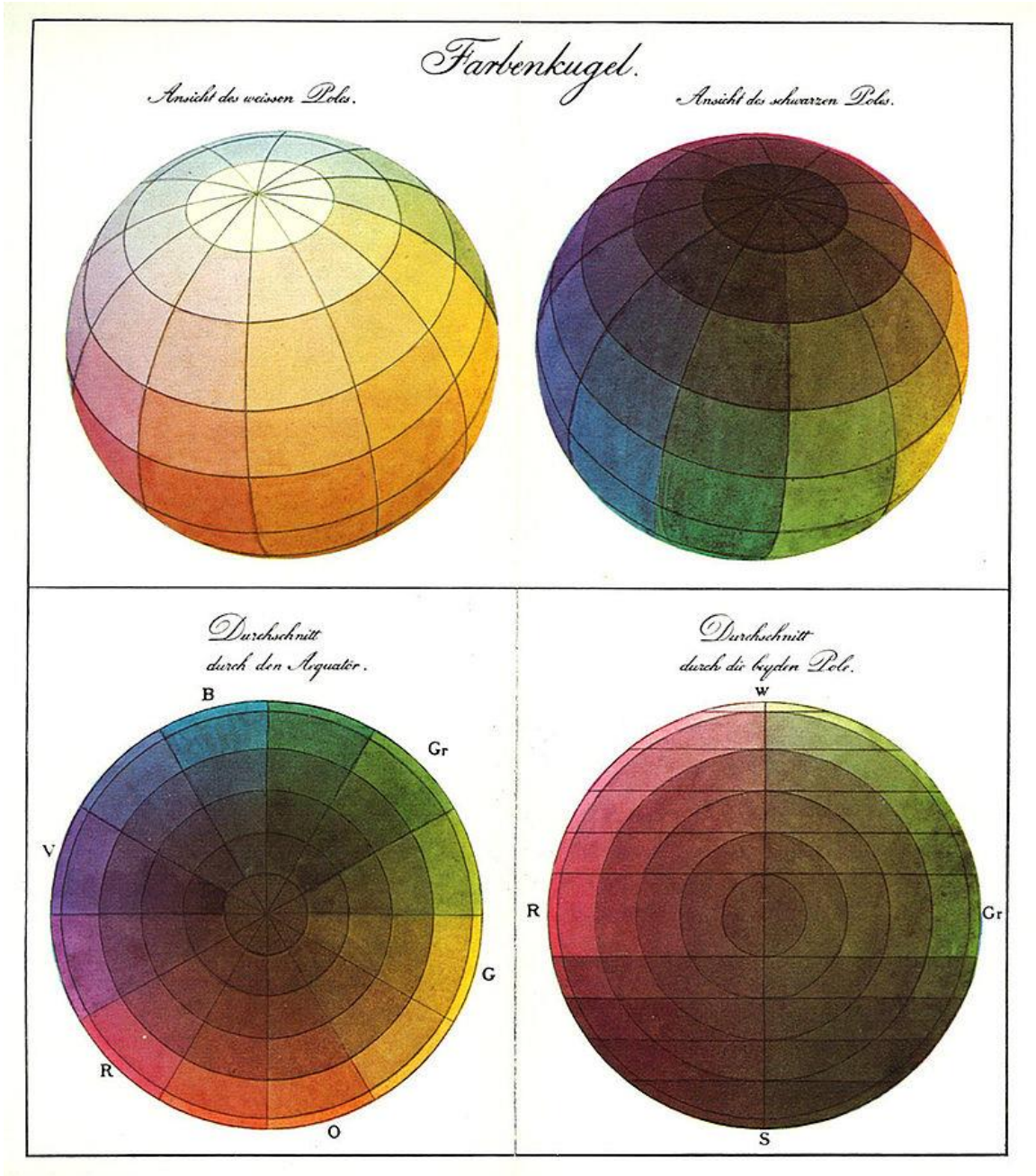
4. **Jaké mohou být podle Vašeho názoru nevýhody senior cohousingu?**
(uzavřená otázka – respondenti mohli vybrat max. 2 z uvedených možností)

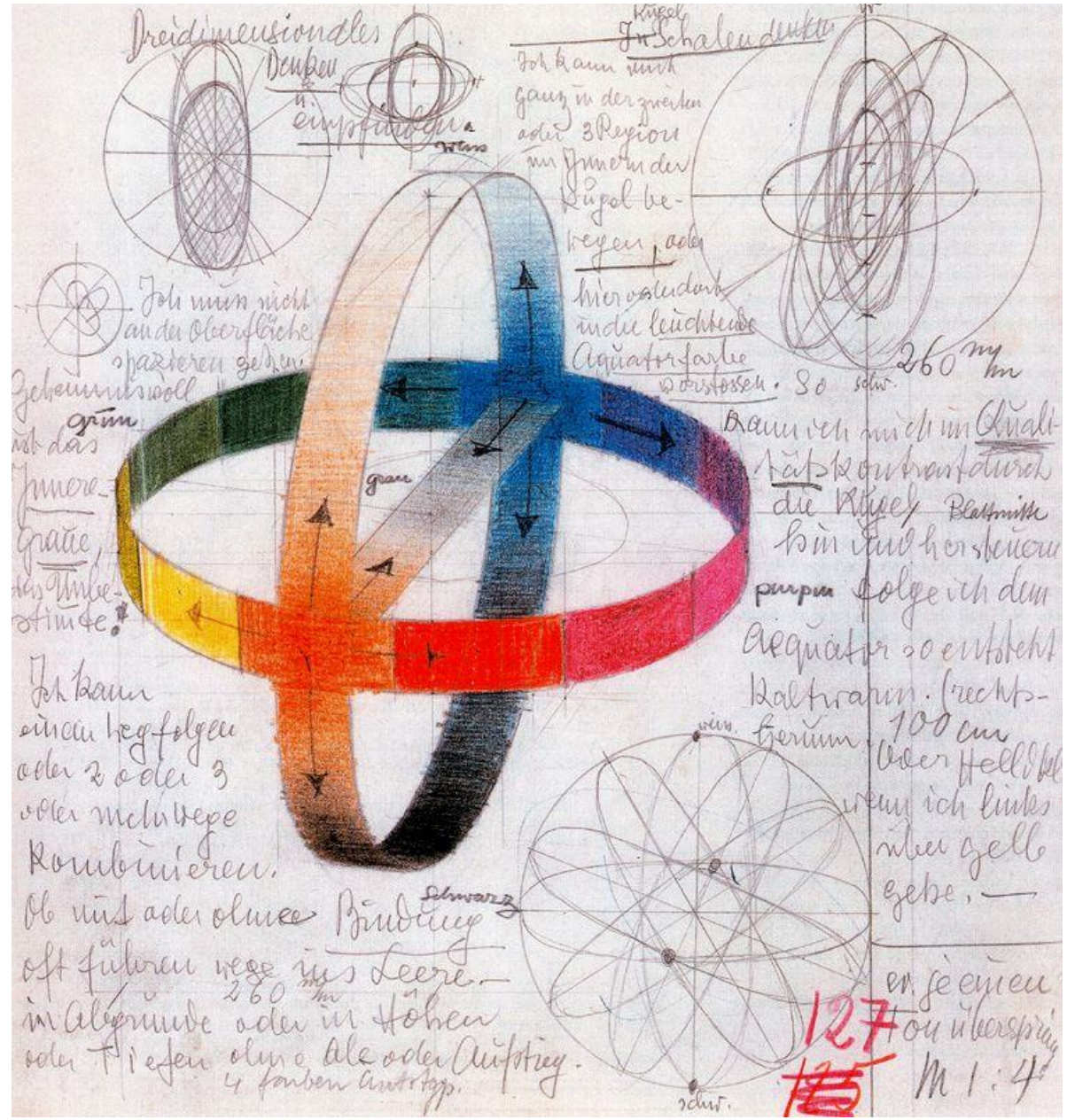


Obrázek 3: Jaké mohou být podle Vašeho názoru nevýhody senior cohousingu?

...ou největší nevýhodu senior cohousingu vidí respondenti všech věkových kategorií v možných „konfliktech" a ...ané „složité vzájemné domluvě". Konflikty jsou ostatně jedním ze skutečných a velmi rizikových faktorů rozpadu ...ných snažících se vybudovat cohousing. ...moc". Obavy zřejmě


ČT24
15 let pro vás
Volební účast v krajích (v %)
2000-2020
sečteno: 0,00 %
33,64
29,62
40,30
36,89
34,57
0,00
2000
2004
2008
2012
2016
2020
Zdroj: ČSÚ
13:32
V BENÁTKÁCH JE PŘI ZVÝŠENÉ HLADINĚ POPRVÉ AKTIVOVÁN PROTIPOVODŇOVÝ SYSTÉM MOJŽÍŠ.


Farbenkugel.
Ansicht des weissen Pols.
Ansicht des schwarzen Pols.
Durchschnitt
durch den Aequator.
Durchschnitt
durch die beyden Pole.
B
Gr
V
G
R
O
W
R
Gr
S

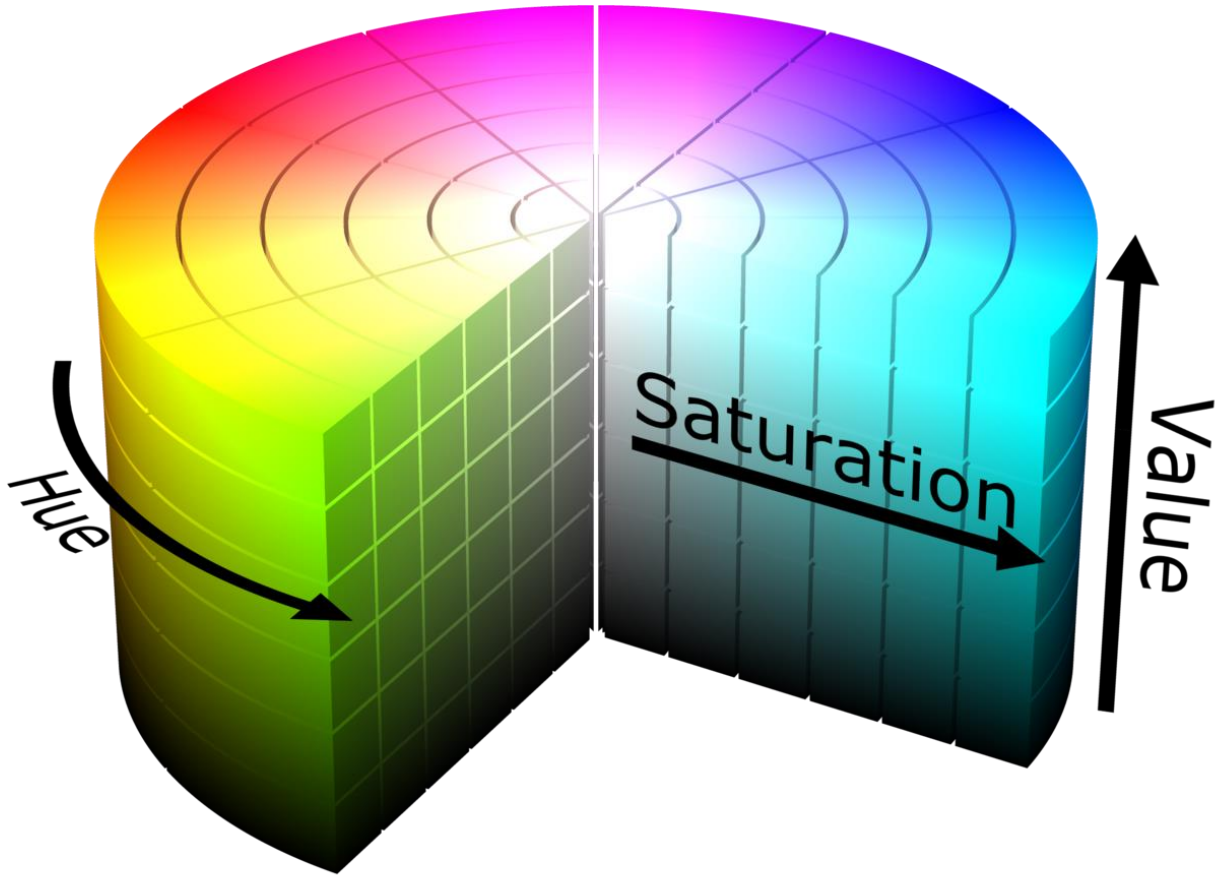

Dreidimensionales
Denken
Kugel
Schalendenken
grün
grau
purpur
Schwarz
260 mμ
127

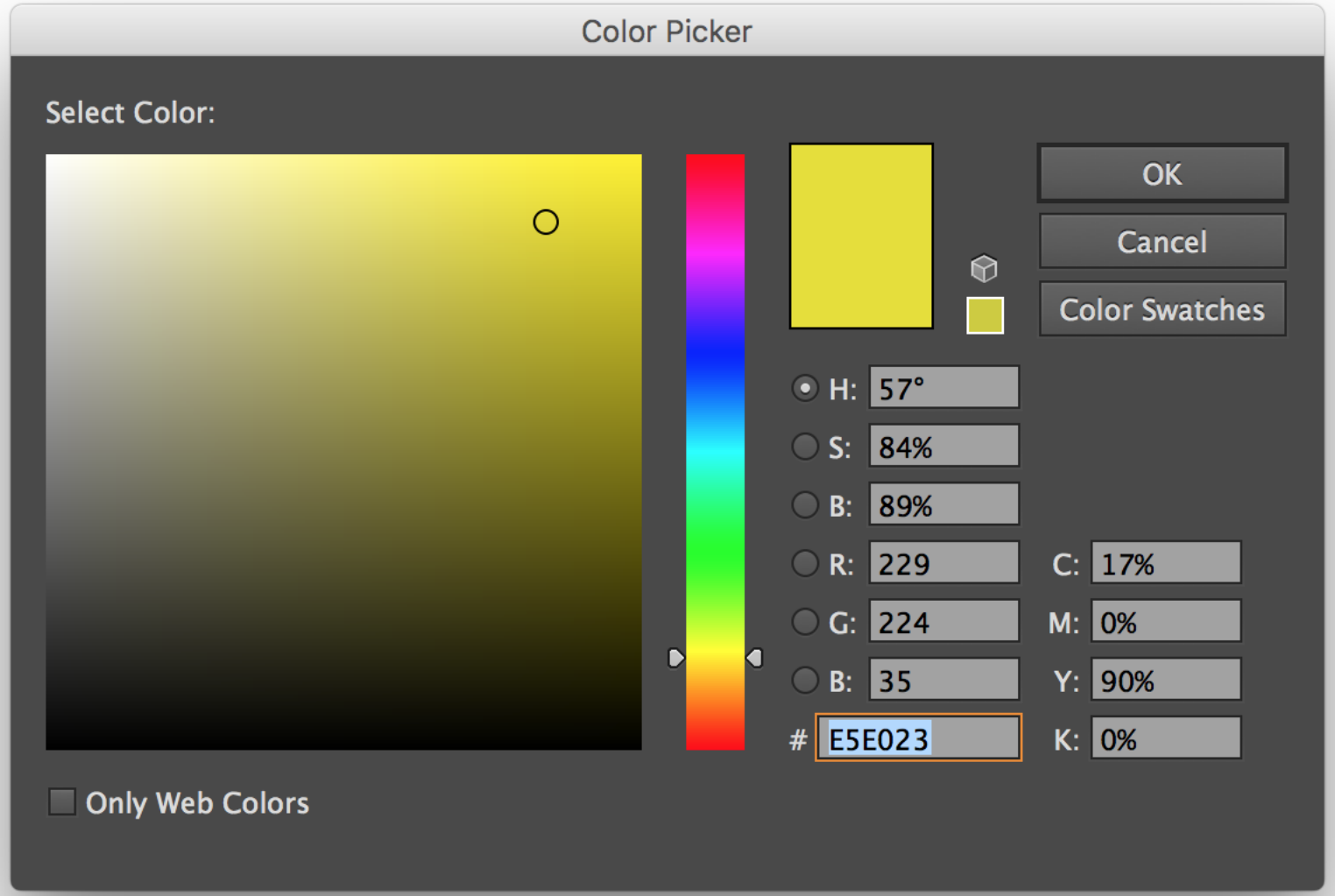
Barevné modely

- HSV, HSL,...

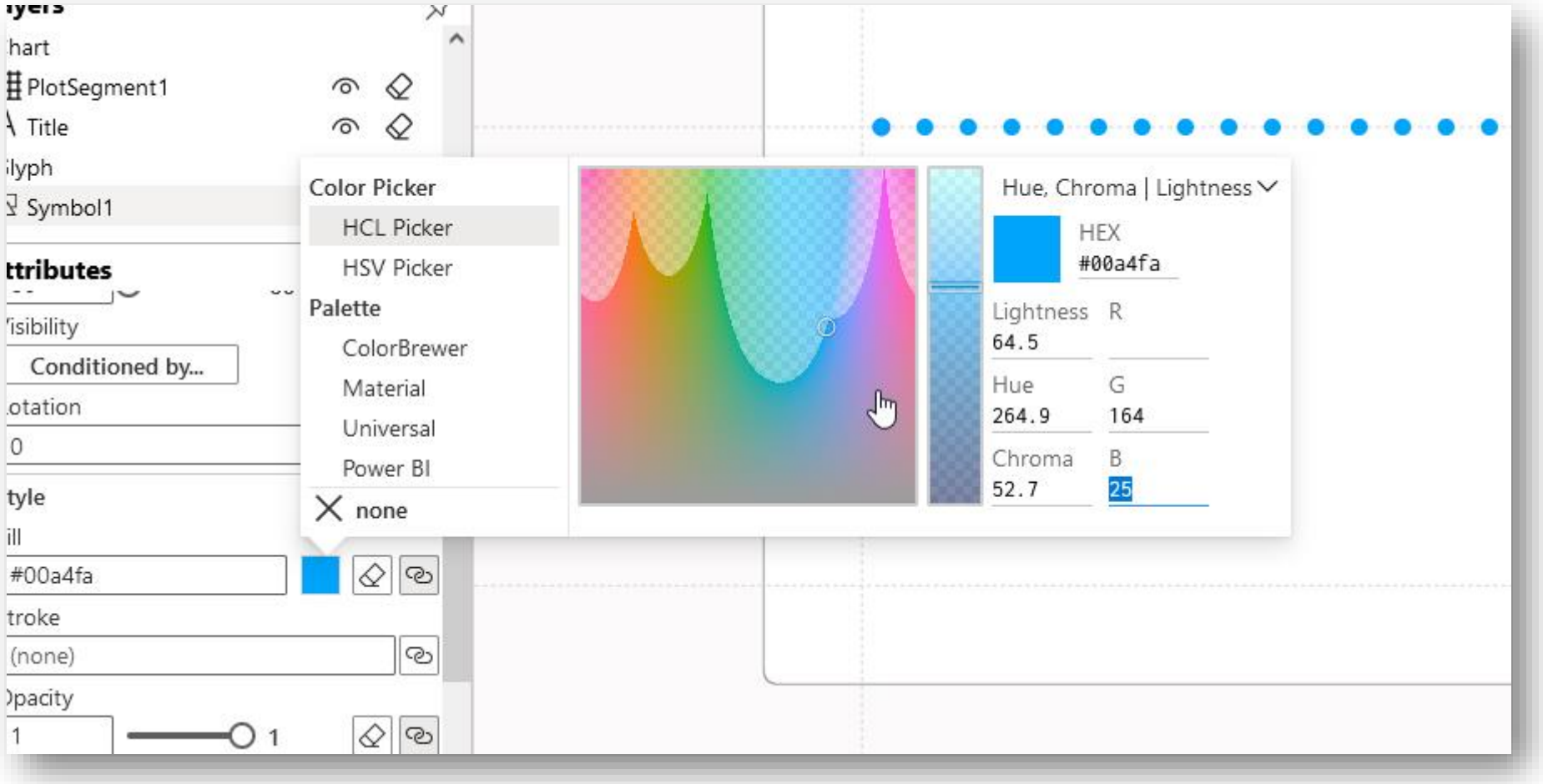
- Tři základní dimenze
- Hue -> odstín – *dominantní vlnová délka*
- Saturation -> chroma, sytost – *síla barvy*
- Value -> hodnota jasu – *množství bílého světla*

Barevné modely

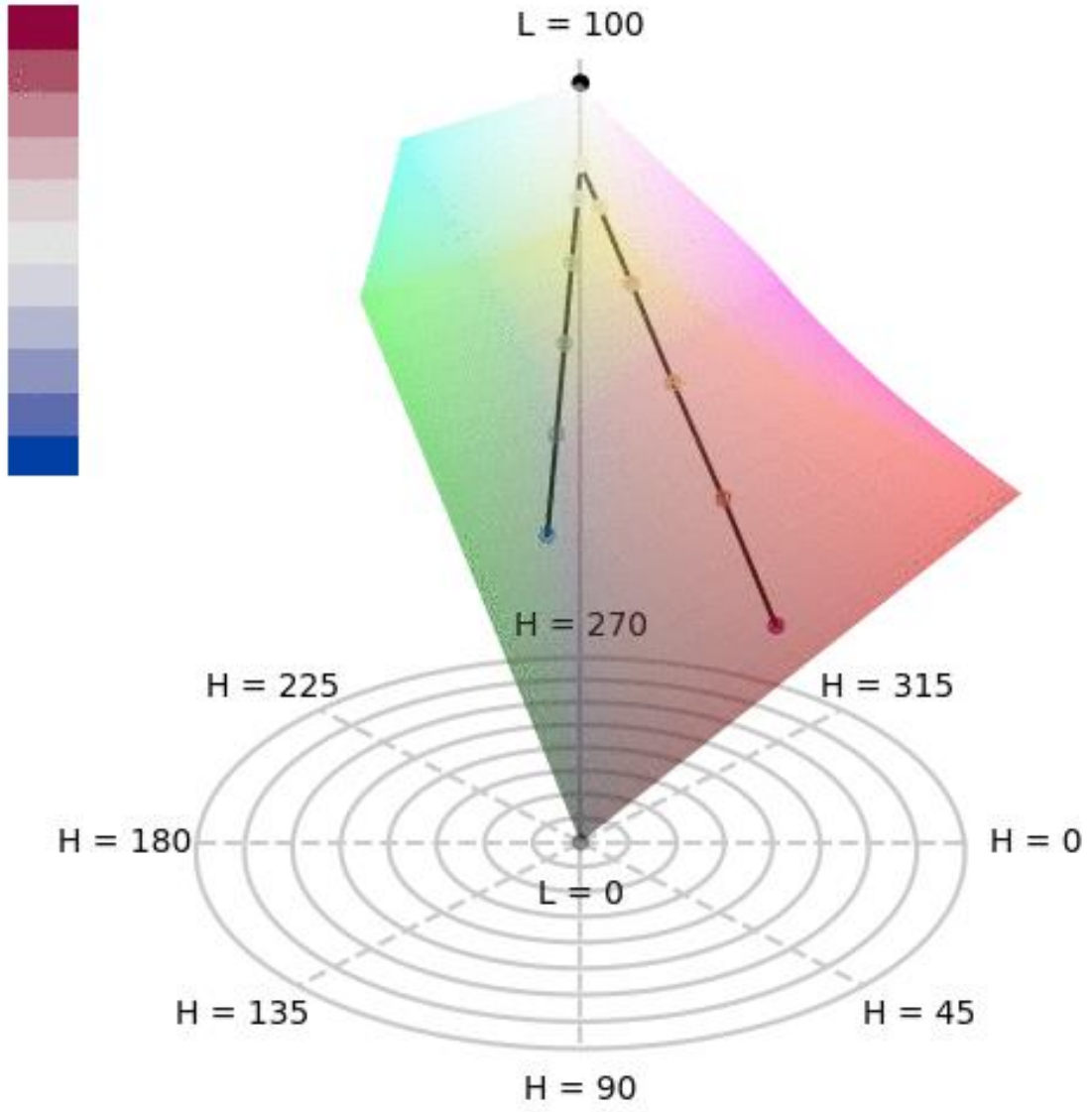


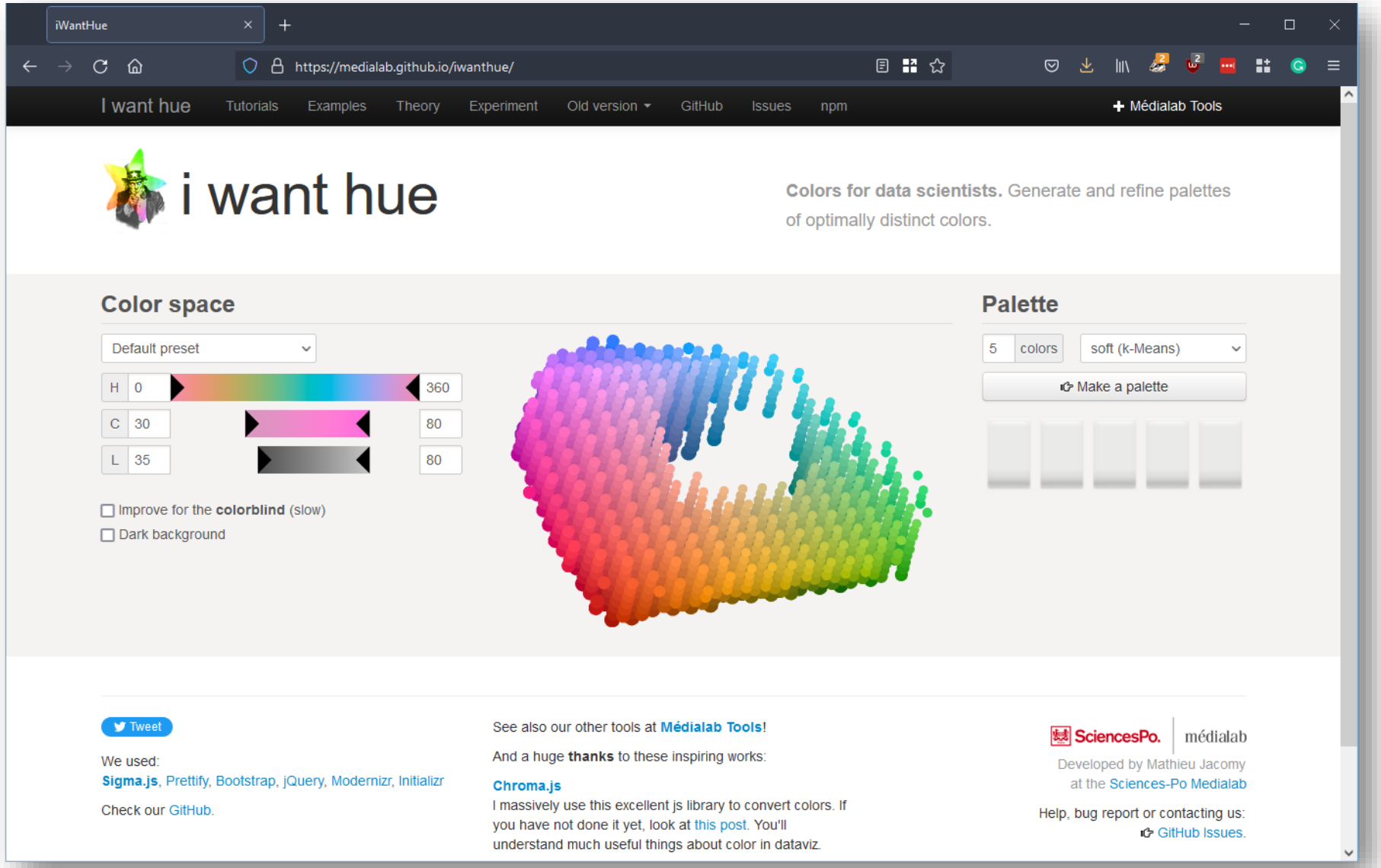

Color Picker
Select Color:
OK
Cancel
Color Swatches
H: 57°
S: 84%
B: 89%
R: 229
G: 224
B: 35
C: 17%
M: 0%
Y: 90%
K: 0%
E5E023
Only Web Colors

HCL Colour Space



HCL Colour Space



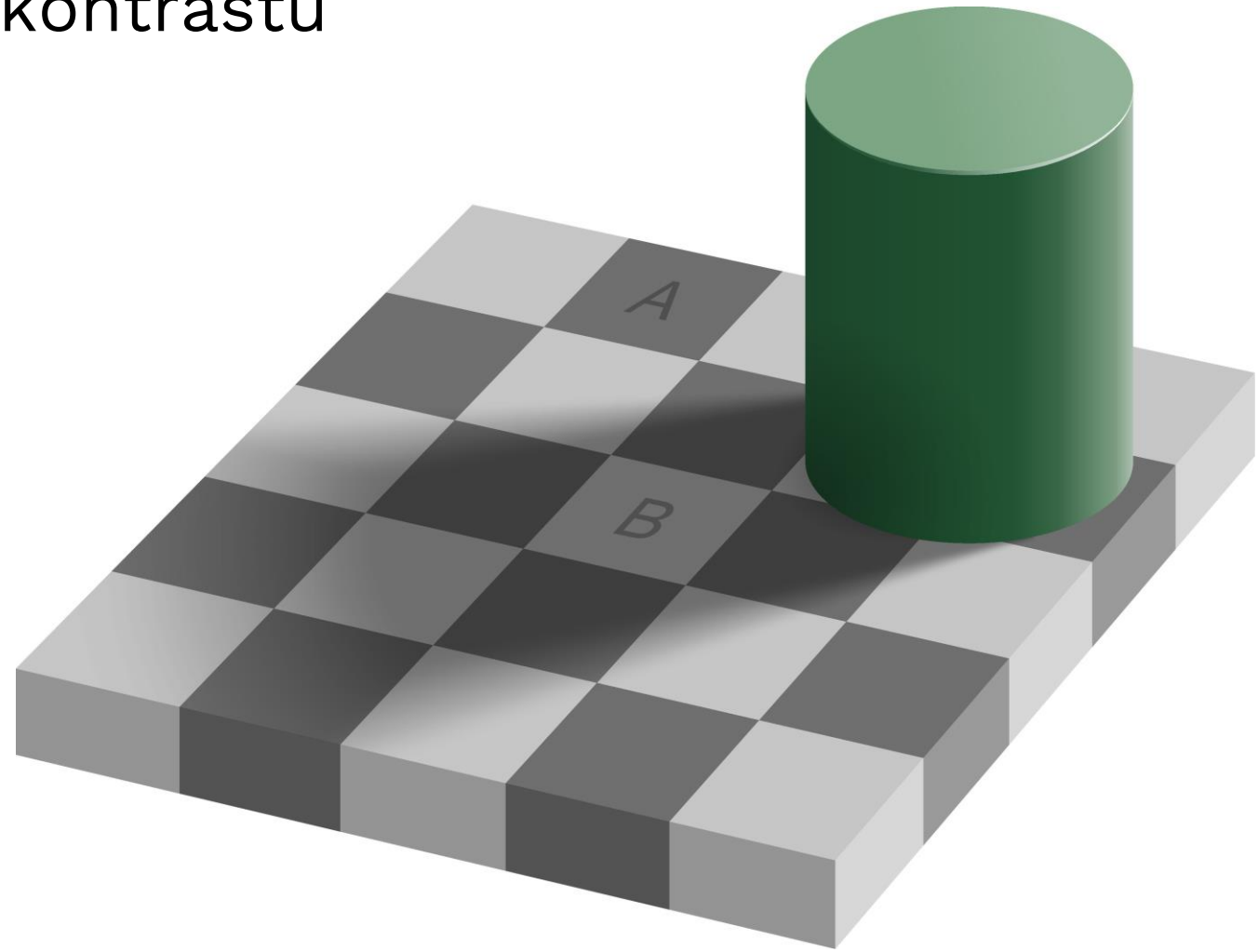

iWantHue
https://medialab.github.io/iwanthue/
I want hue
Tutorials
Examples
Theory
Experiment
Old version
GitHub
Issues
npm
+ Médialab Tools
i want hue
Colors for data scientists. Generate and refine palettes of optimally distinct colors.
Color space
Default preset
H 0 360
C 30 80
L 35 80
Improve for the colorblind (slow)
Dark background
Palette
5 colors
soft (k-Means)
Make a palette
Tweet
We used:
Sigma.js, Prettify, Bootstrap, jQuery, Modernizr, Initializr
Check our GitHub.
See also our other tools at Médialab Tools!
And a huge thanks to these inspiring works:
Chroma.js
I massively use this excellent js library to convert colors. If you have not done it yet, look at this post. You'll understand much useful things about color in dataviz.
SciencesPo. médialab
Developed by Mathieu Jacomy at the Sciences-Po Medialab
Help, bug report or contacting us:
GitHub Issues.

Interakce barev

- oko není kamera
- role kontextu a zkušenosti
- jednotnost barvy objektu bez ohledu na dobu
- **konstantnost barvy**

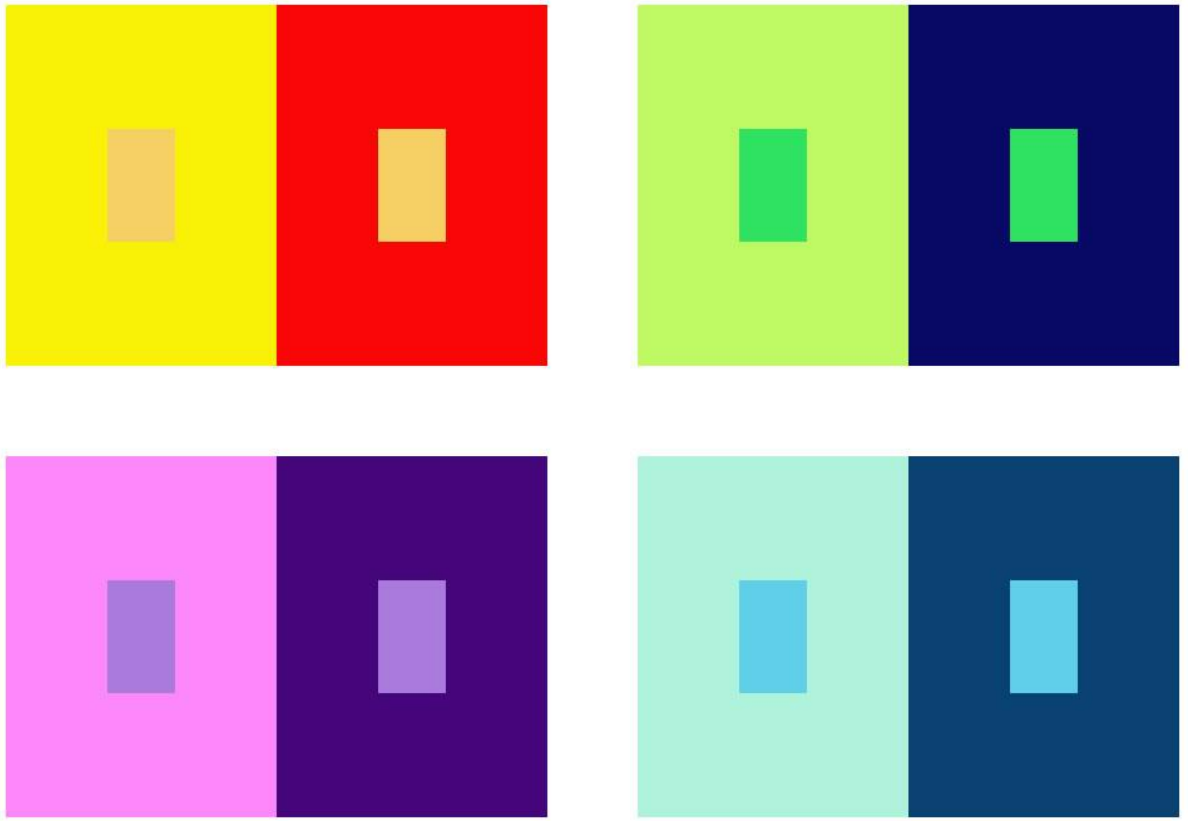
- *užitečné pro reálný svět*
- *problematické pro informační grafiku*

iluze barevného kontrastu

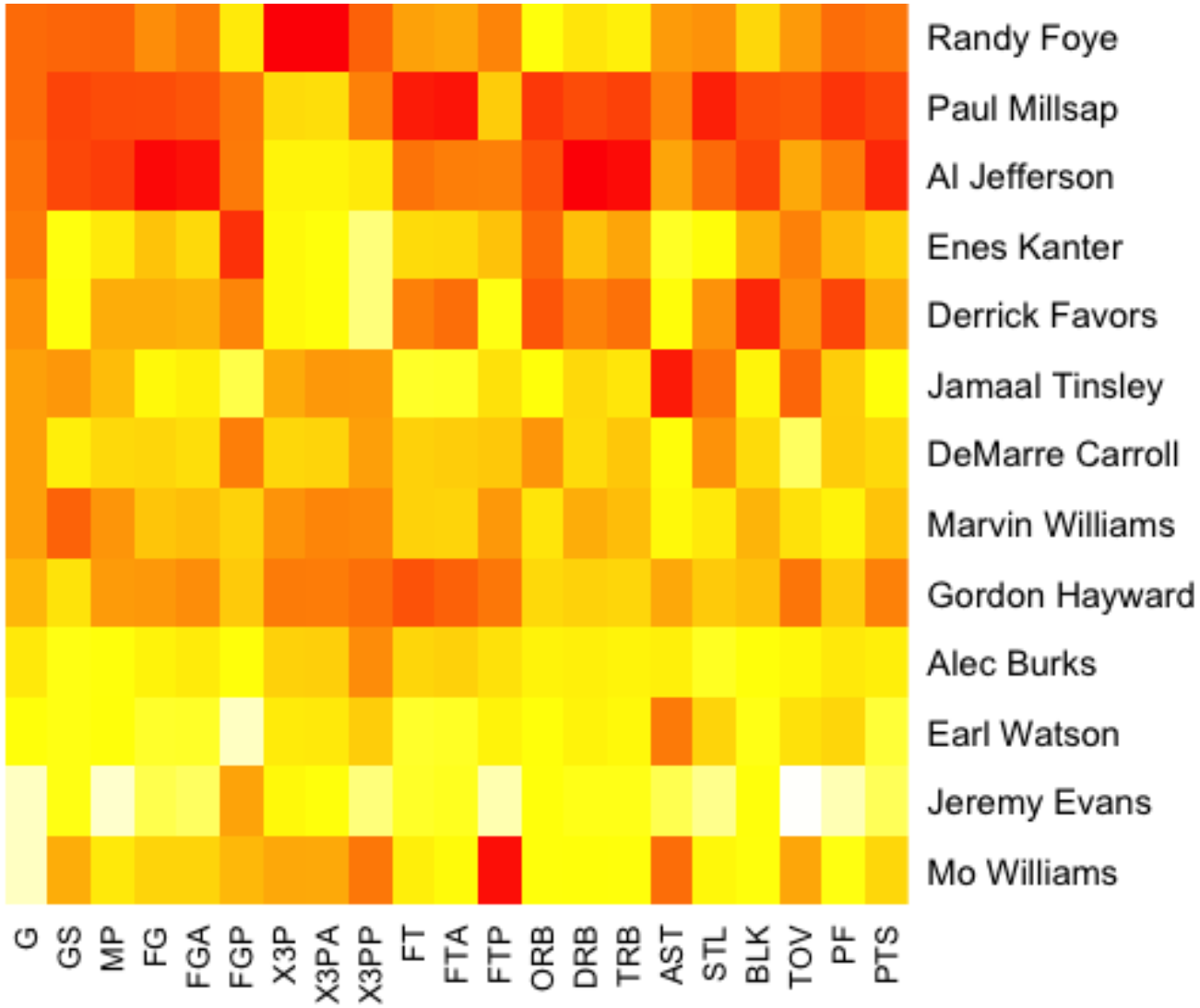


Michel Eugène Chevreul - The Principles of Harmony and Contrast of Colours (1839)

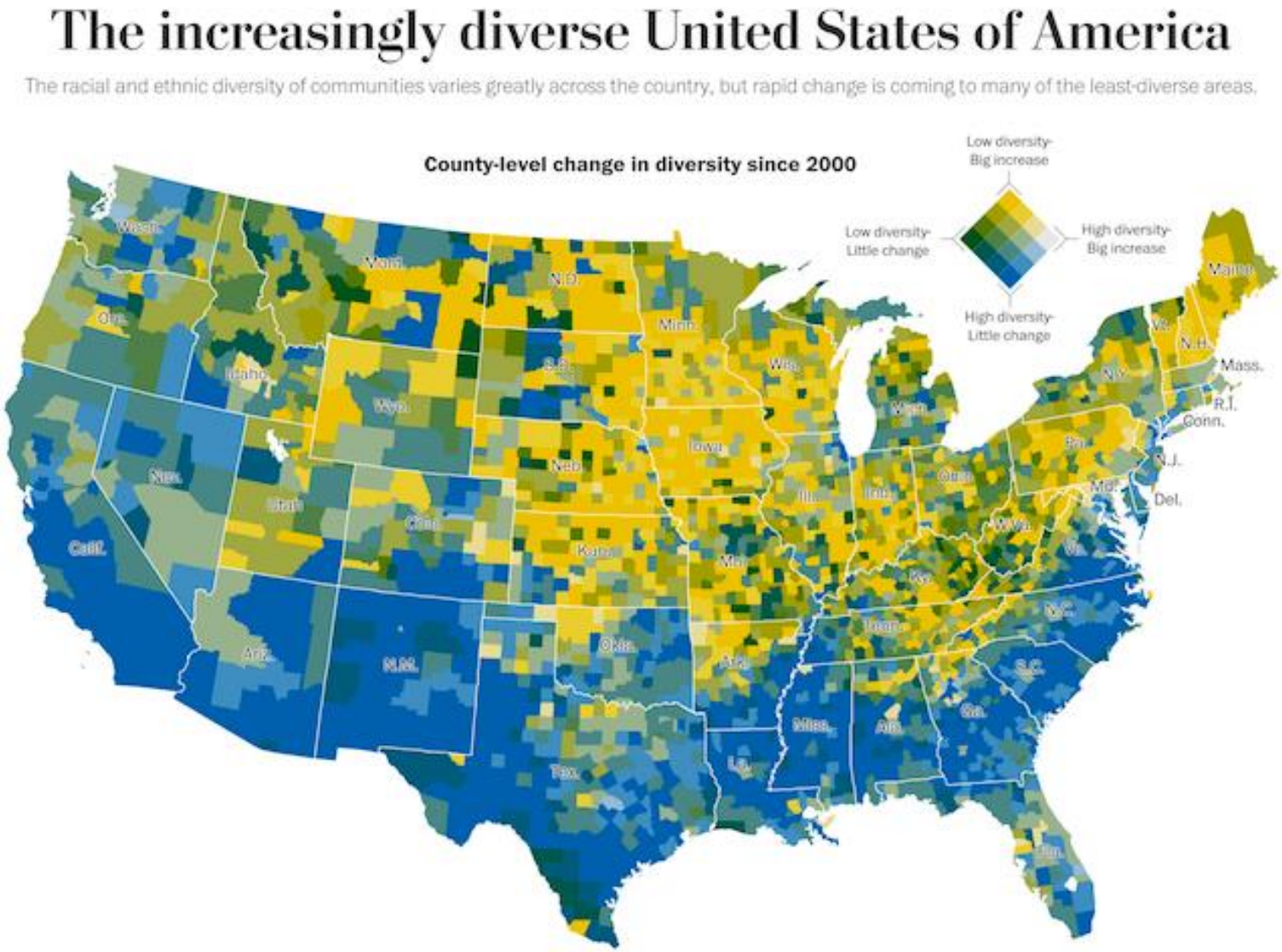
iluze barevného kontrastu



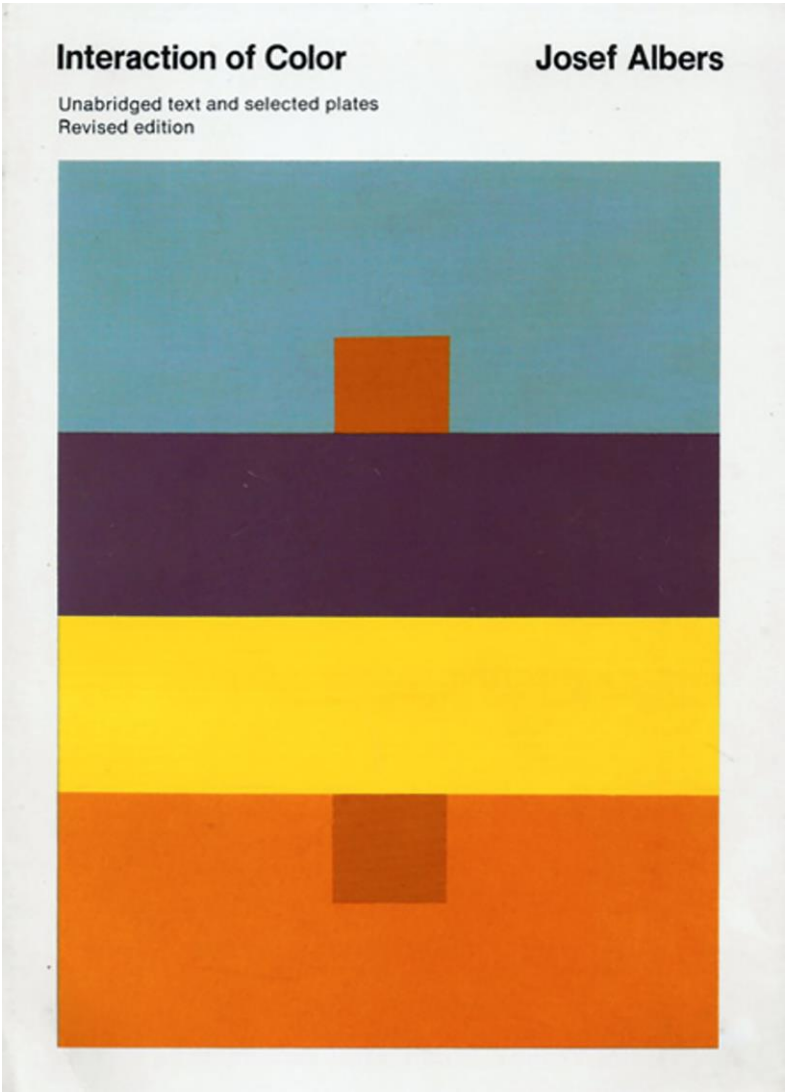
iluze barevného kontrastu

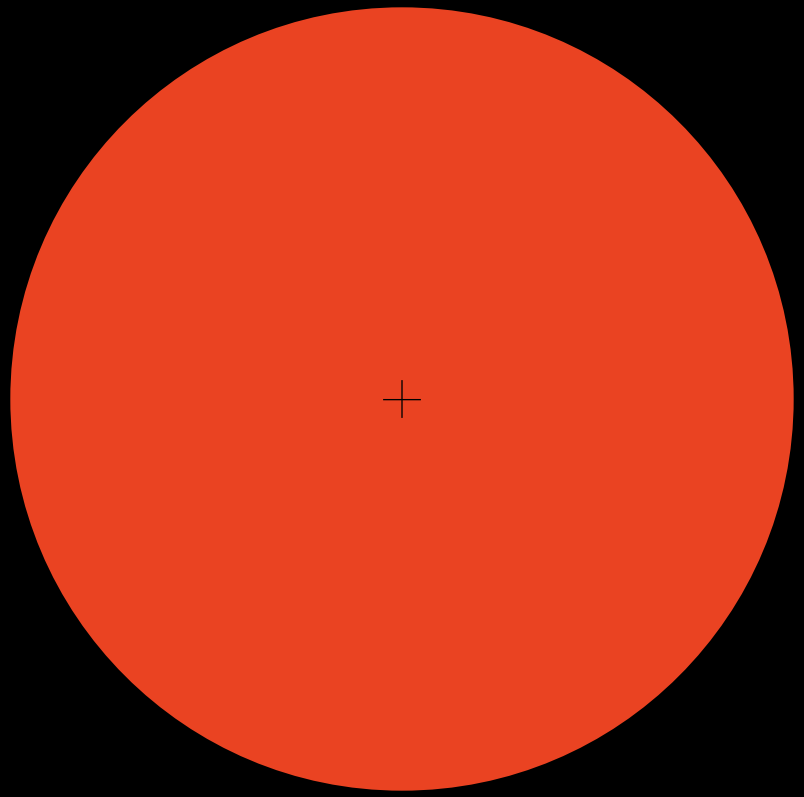


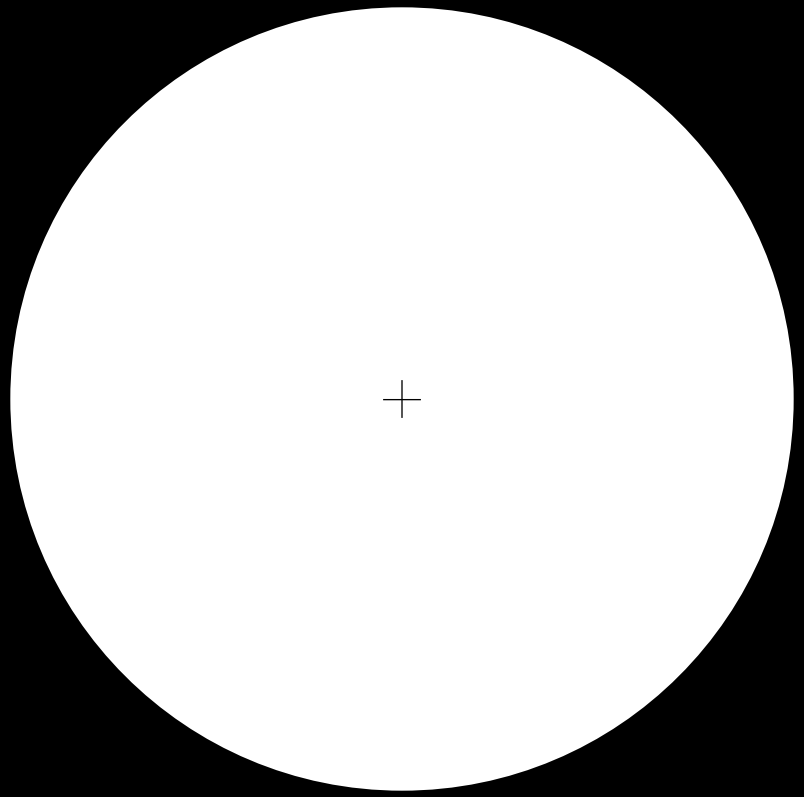
iluze barevného kontrastu

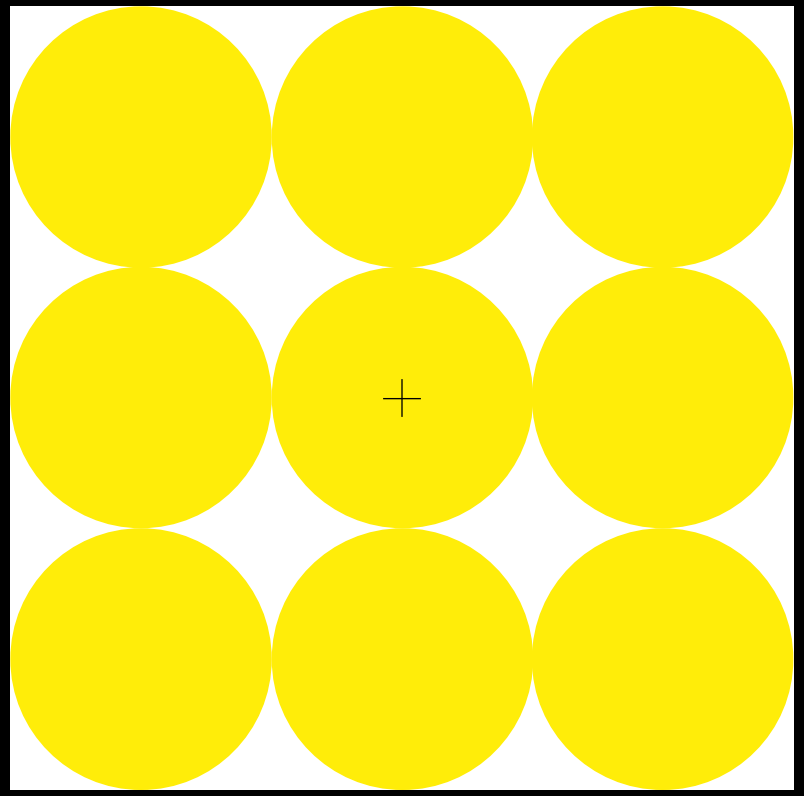


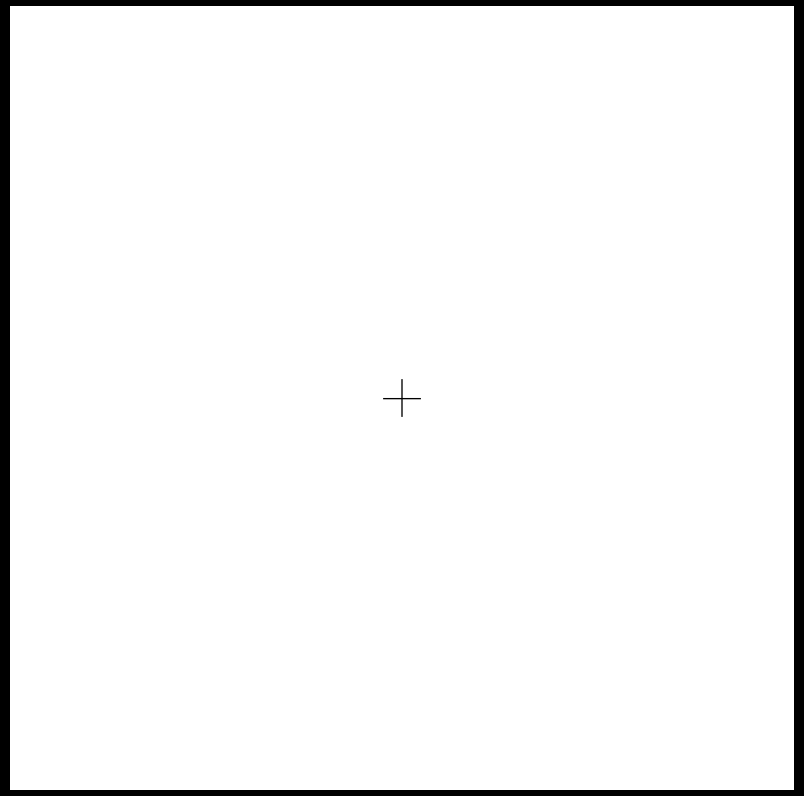
Josef Albers



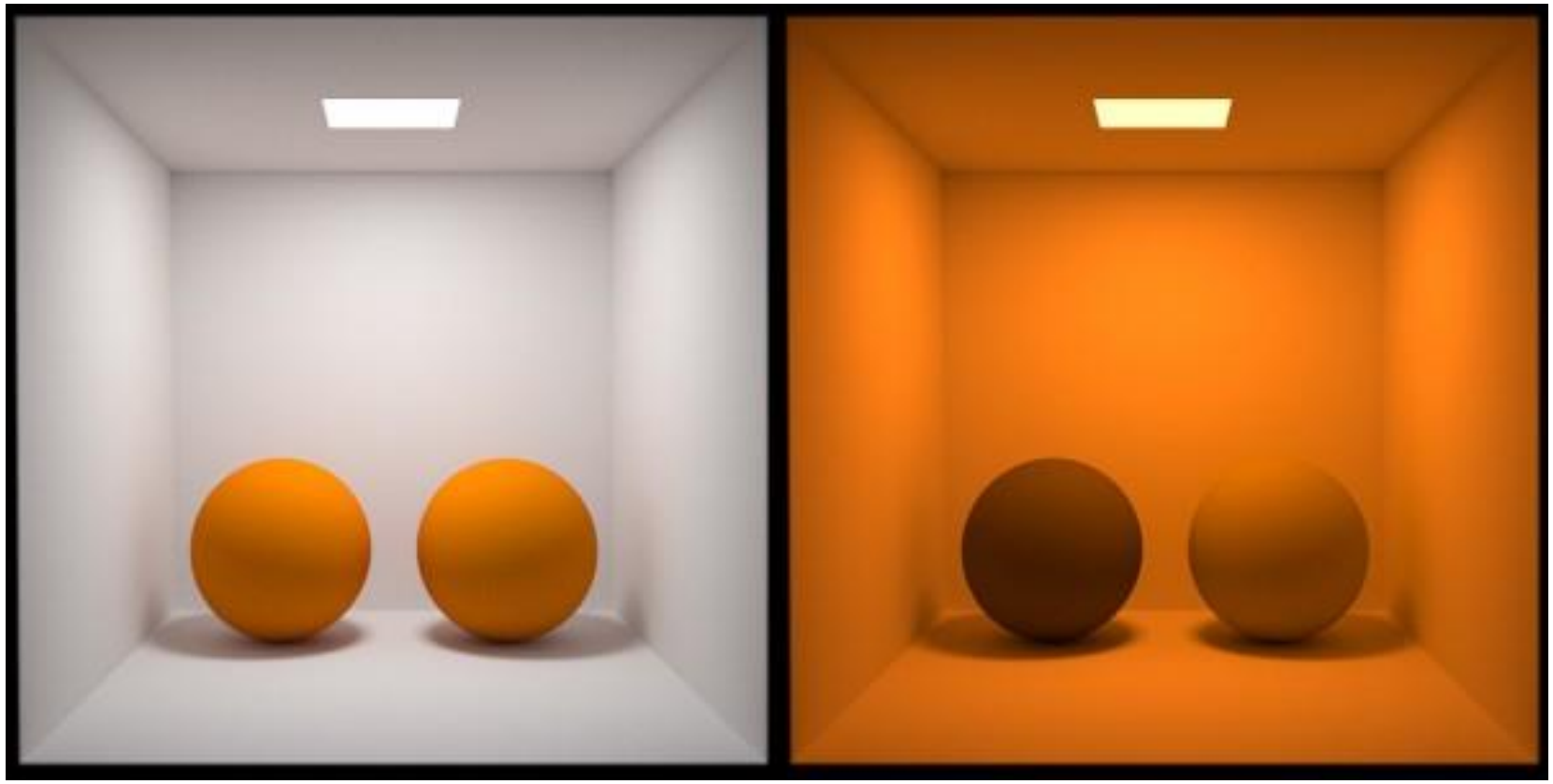




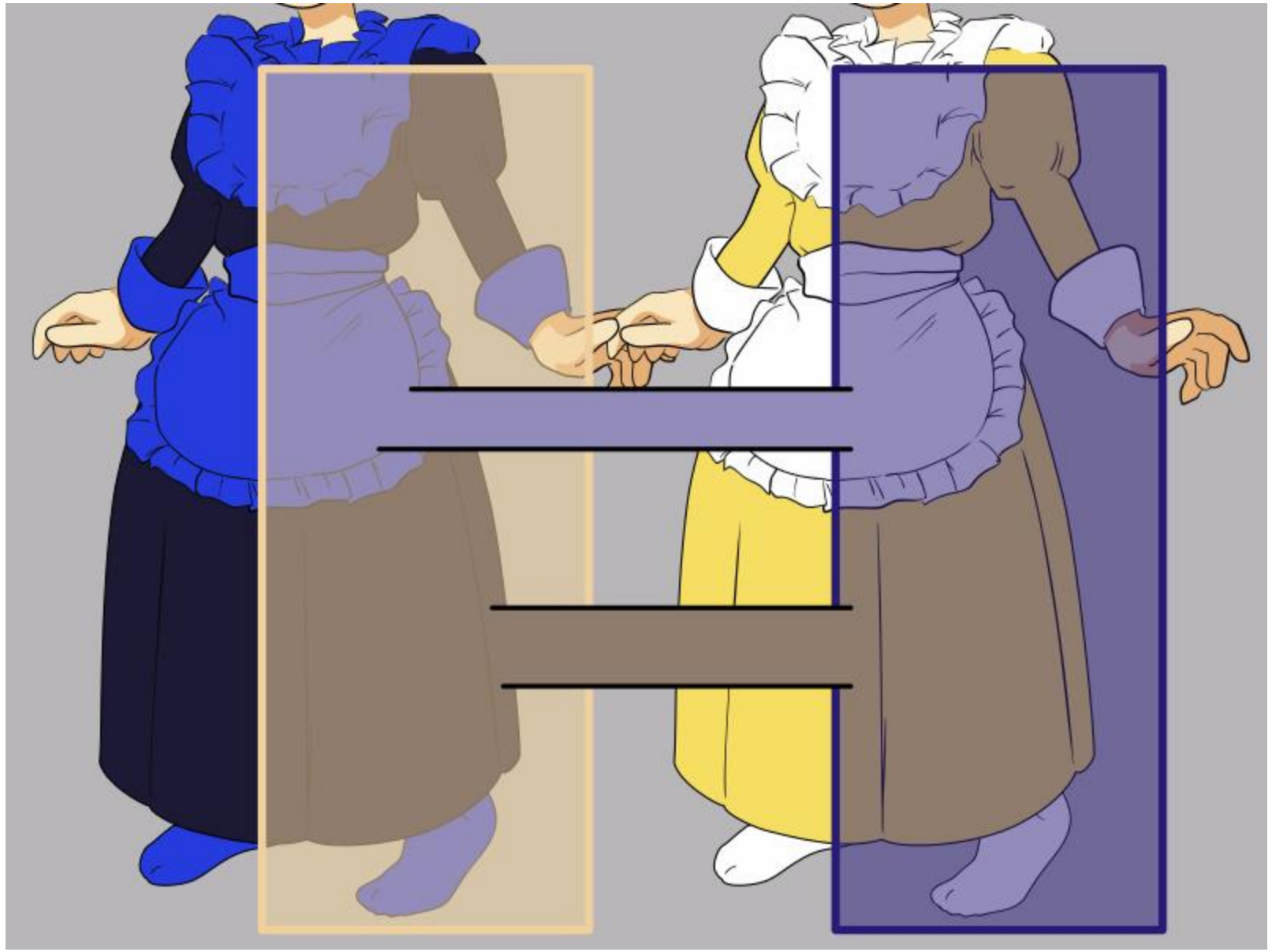




metamerismus



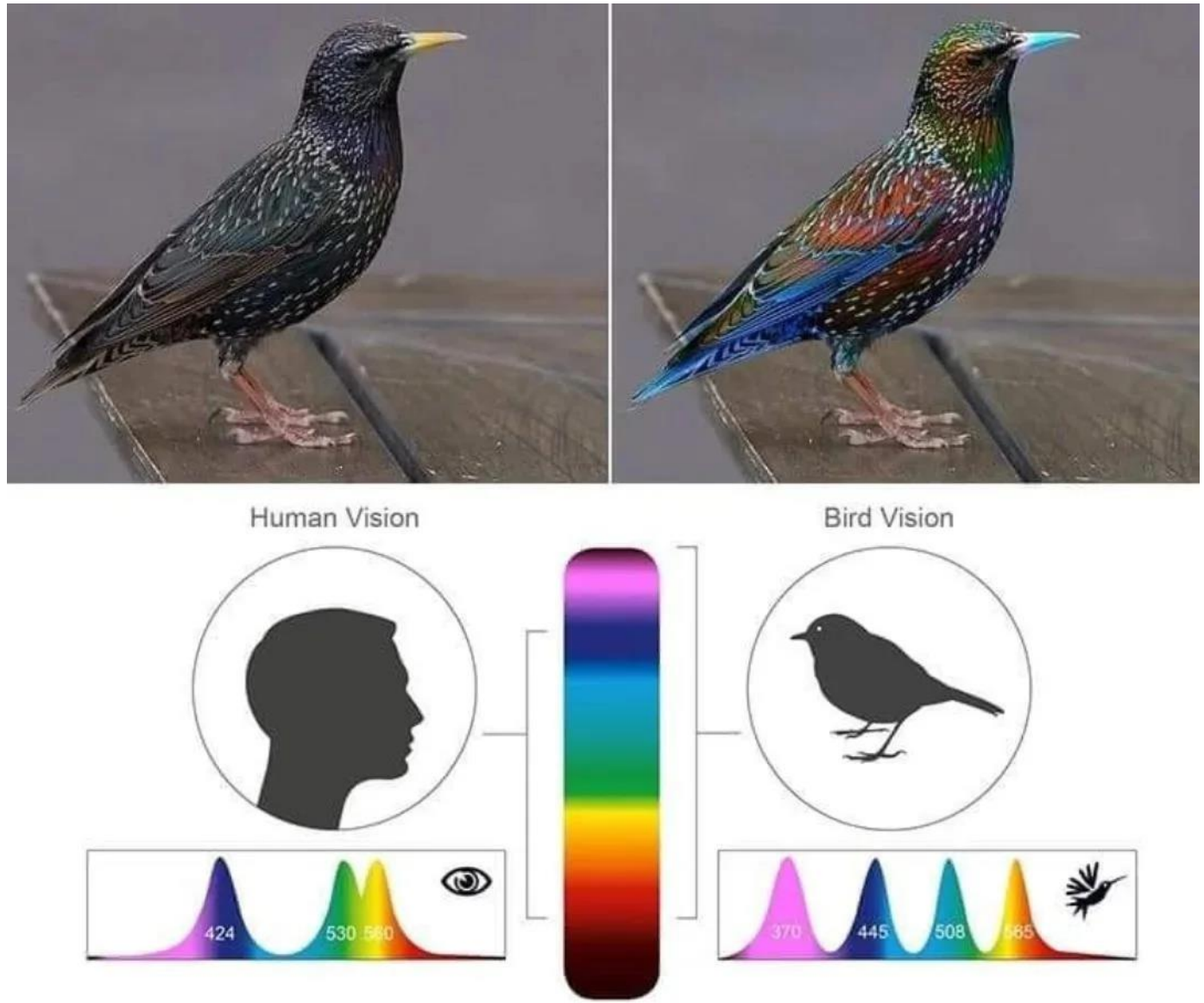
metamerismus



Anomálie barevného vidění

- běžné vidění je trichromatické
- tři druhy čípků = tři barvy

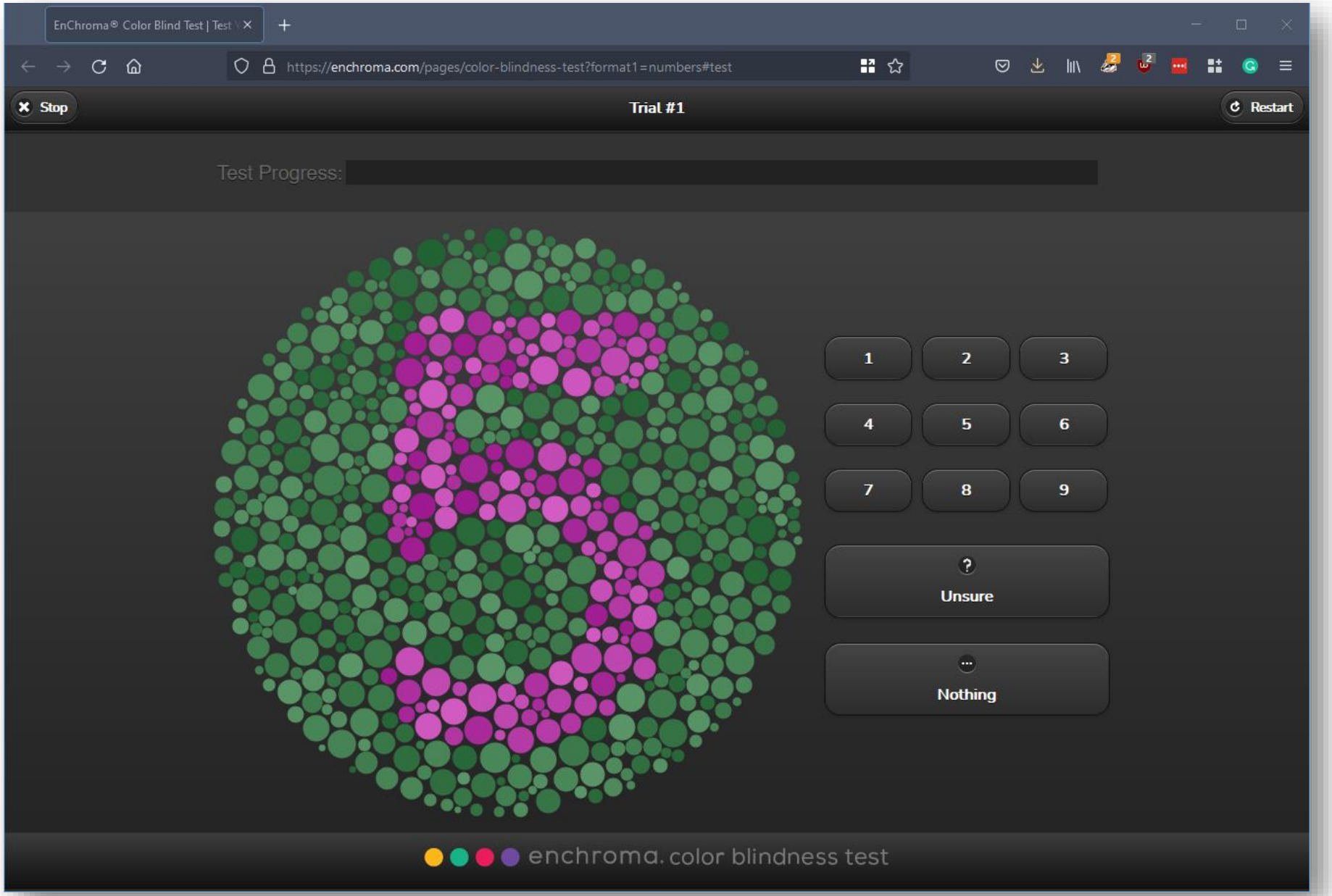
- těžko odhadnout, kolik lidí má vadu barvocitu
- muži (genetická vada v chromozomu X): 8-9 %
- ženy: 0.5 % (tetrachromatické vidění – 100x širší sp.)

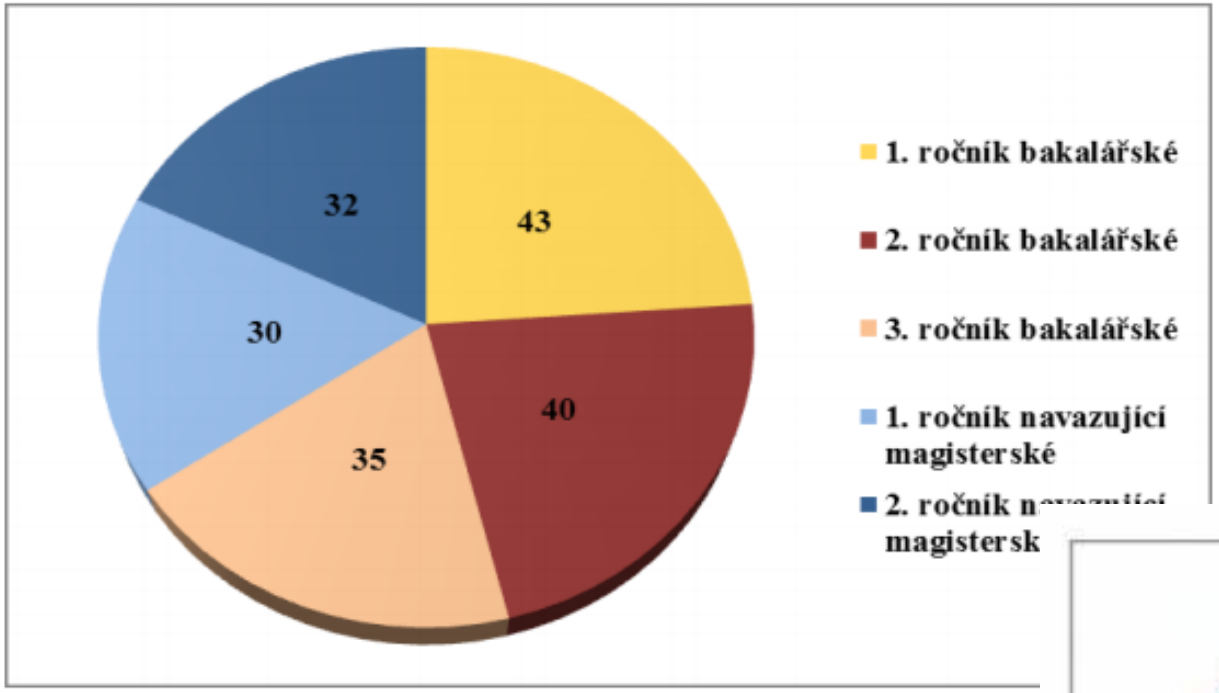

Human Vision
Bird Vision
424
530
560
370
445
508
565

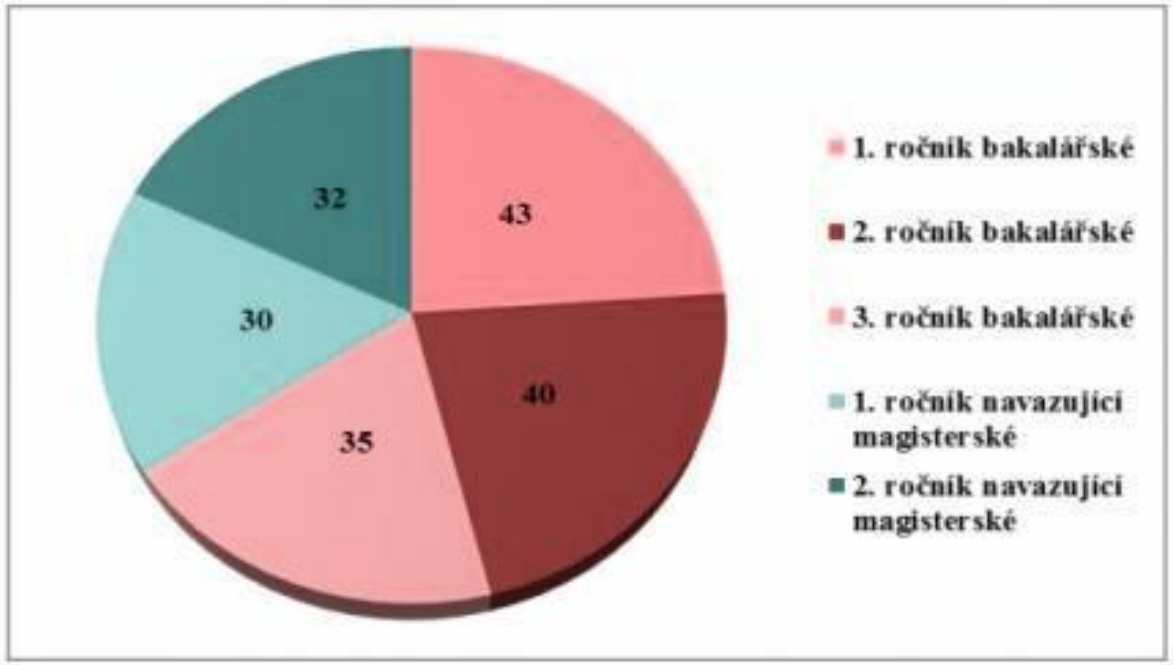
Anomálie barevného vidění

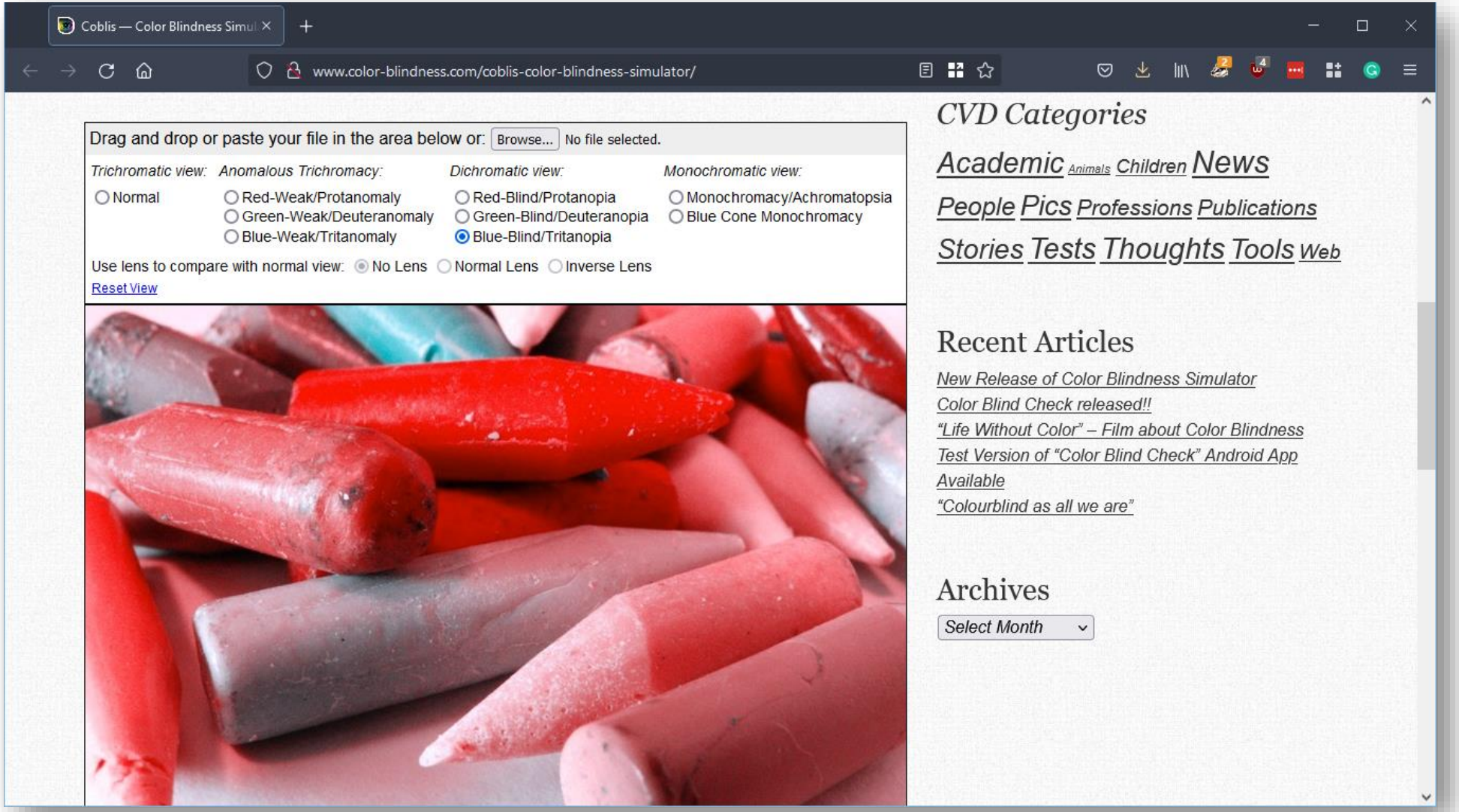
- Protanopie - červená
- Deuteranopie - zelená
- Tritanopie – modrá
- Achromatopsie

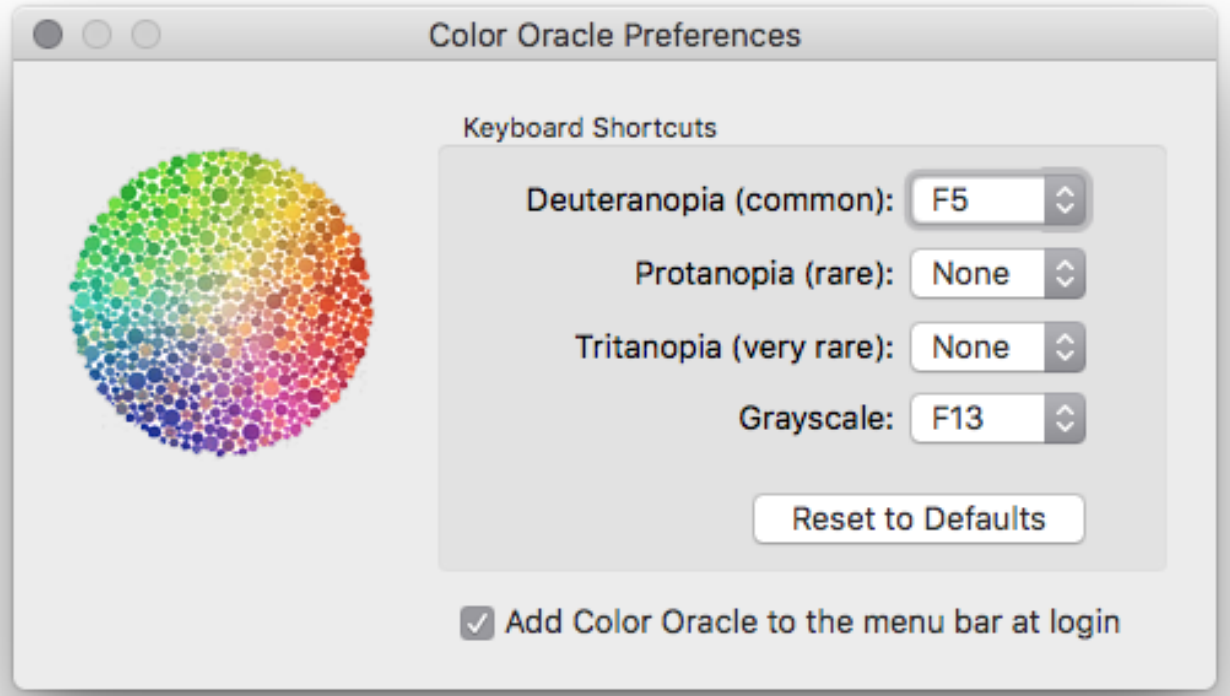
- pseudoizochromatické tabulky
- Ishiharovy testy

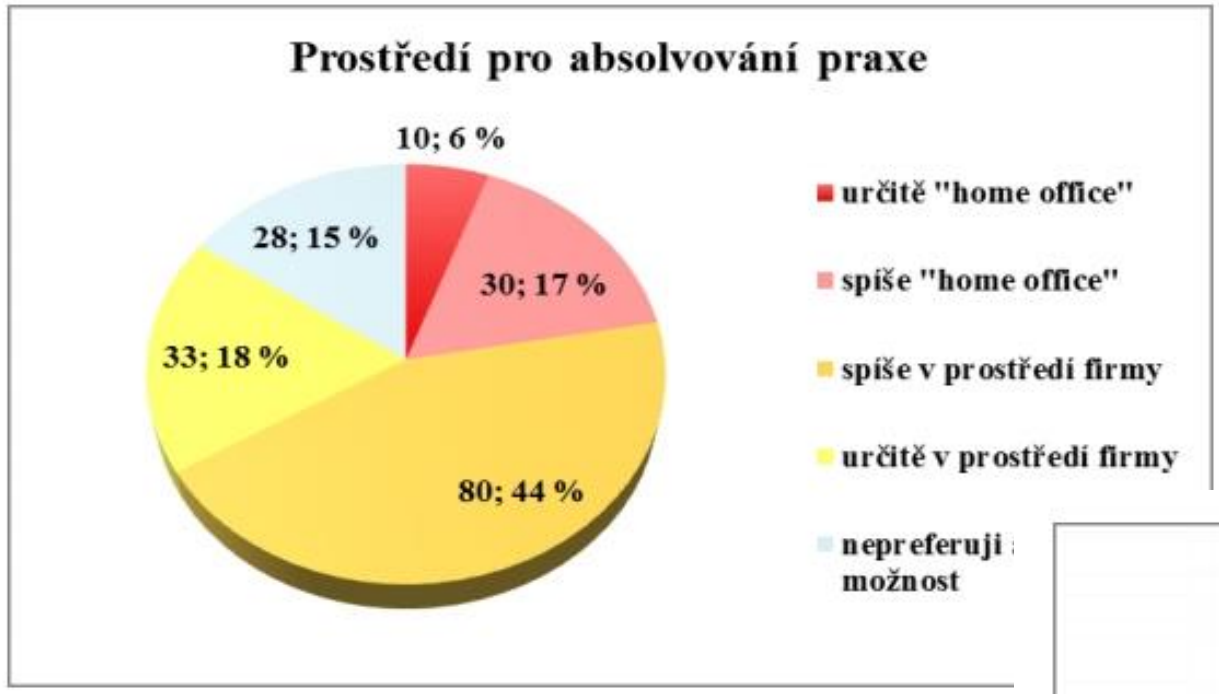

EnChroma® Color Blind Test | Test
https://enchroma.com/pages/color-blindness-test?format1=numbers#test
Stop
Trial #1
Restart
Test Progress:
1
2
3
4
5
6
7
8
9
Unsure
Nothing
enchroma. color blindness test

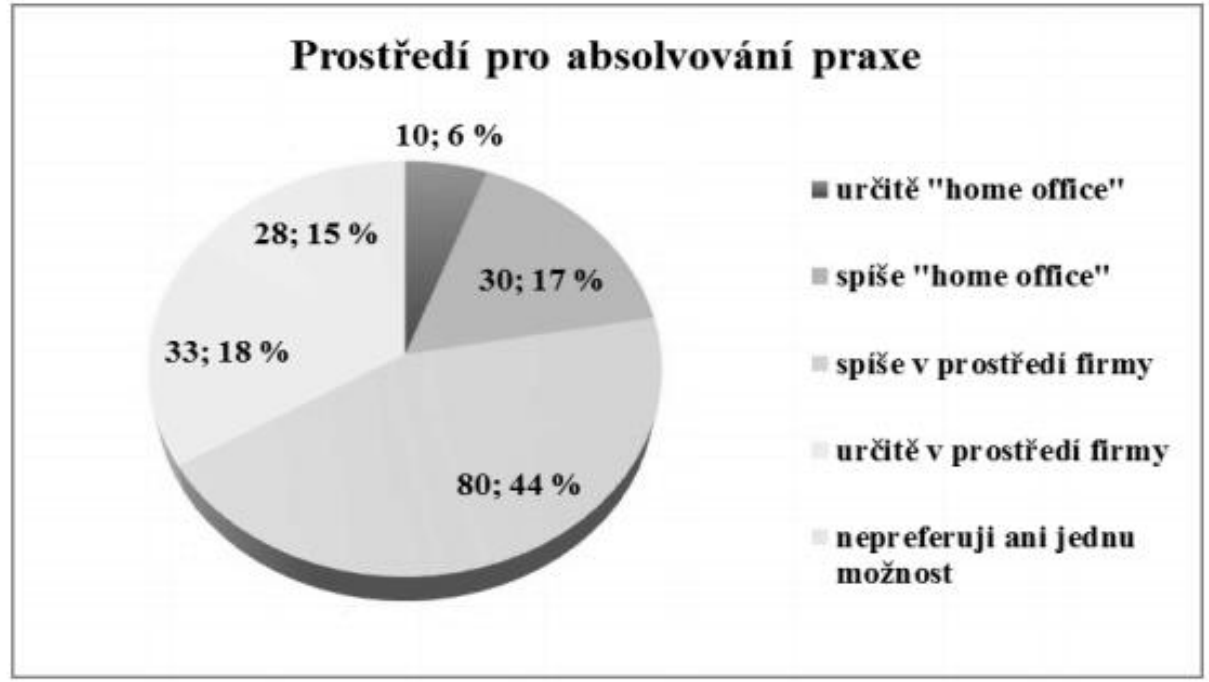

43
40
35
30
32
1. ročník bakalářské
2. ročník bakalářské
3. ročník bakalářské
1. ročník navazující magisterské
2. ročník navazující magisterské


43
40
35
30
32
1. ročník bakalářské
2. ročník bakalářské
3. ročník bakalářské
1. ročník navazující magisterské
2. ročník navazující magisterské


Coblis — Color Blindness Simul
www.color-blindness.com/coblis-color-blindness-simulator/
Drag and drop or paste your file in the area below or: Browse... No file selected.
Trichromatic view:
Anomalous Trichromacy:
Normal
Red-Weak/Protanomaly
Green-Weak/Deuteranomaly
Blue-Weak/Tritanomaly
Dichromatic view:
Red-Blind/Protanopia
Green-Blind/Deuteranopia
Blue-Blind/Tritanopia
Monochromatic view:
Monochromacy/Achromatopsia
Blue Cone Monochromacy
Use lens to compare with normal view: No Lens Normal Lens Inverse Lens
Reset View
CVD Categories
Academic Animals Children News
People Pics Professions Publications
Stories Tests Thoughts Tools Web
Recent Articles
New Release of Color Blindness Simulator
Color Blind Check released!!
"Life Without Color" – Film about Color Blindness
Test Version of "Color Blind Check" Android App Available
"Colourblind as all we are"
Archives
Select Month


Color Oracle Preferences
Keyboard Shortcuts
Deuteranopia (common): F5
Protanopia (rare): None
Tritanopia (very rare): None
Grayscale: F13
Reset to Defaults
Add Color Oracle to the menu bar at login


Prostředí pro absolvování praxe
10; 6 %
30; 17 %
80; 44 %
33; 18 %
28; 15 %
určitě "home office"
spíše "home office"
spíše v prostředí firmy
určitě v prostředí firmy
nepreferuji
možnost


Prostředí pro absolvování praxe
10; 6 %
30; 17 %
80; 44 %
33; 18 %
28; 15 %
určitě "home office"
spíše "home office"
spíše v prostředí firmy
určitě v prostředí firmy
nepreferuji ani jednu možnost

Obama's Divided Nation

ma presides over
ca more divided
any time in 50
y that was riven
racial lines gath-
2008 to elect its
ident. That presi-
our years dividing
the basis of eco-
The campaign re-
vealed no evi-
dence that Mr.
Obama will close
the chasm he has
created between
his voters and
those he attacked
and vilified.

It may be true
hat Mitt Romney
ailed to respond

Source: AP

drawn attention to what hap-

Obama spokestotum replied:

problem with pols, e
verbally facile as Mr.
that in crunch time,
reverts to No. 1. Exi
that 9% of the electo
who to vote for jus
Tuesday; and amo
42% said Mr. Oban
Sandy response—t
tie photo-op—wa
factor. Of those,
voted for Mr. Ob
Mr. Christie is o
politico who is

Yes, Republic
across two pres
that there are
how crudely
issue like ill
Blowing up th
if you thoug
day's results

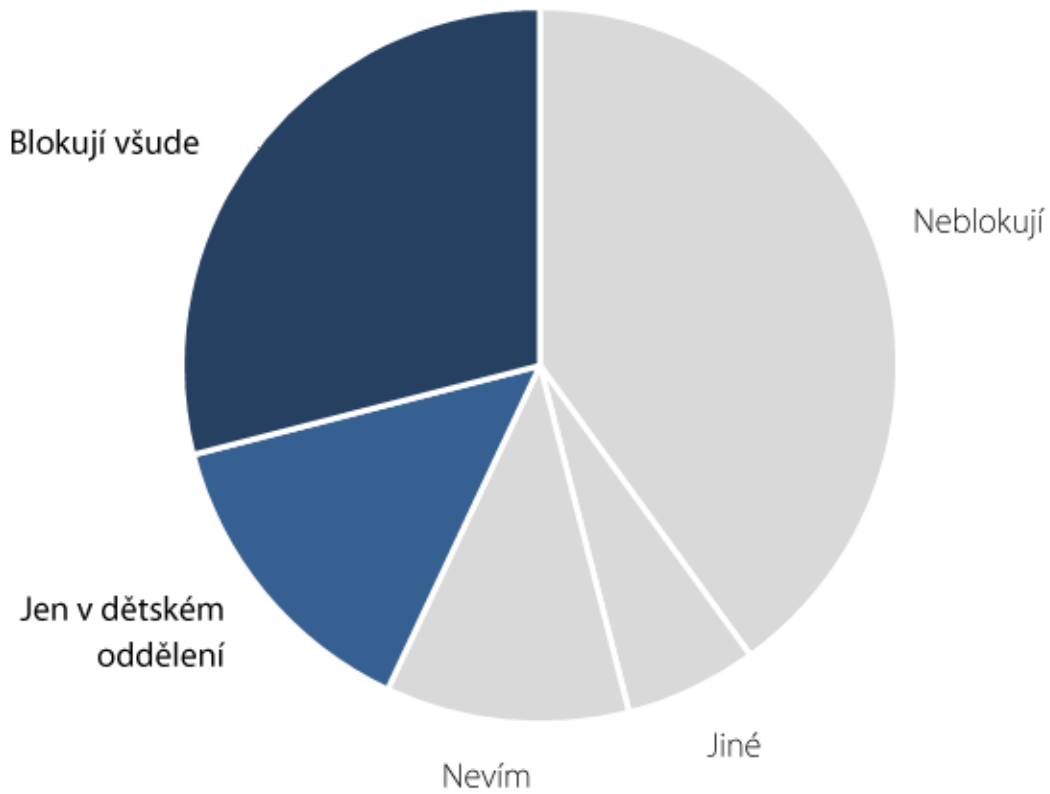
Co s tím vším?

“In visual perception a color is almost never seen as it really is— as it physically is. This fact makes color the most relative medium in art. In order to use color effectively it is necessary to recognize that color deceives continually. To this end, the beginning is not a study of color systems. First, it should be learned that one and the same color evokes innumerable readings.” – Josef Albers

Volba palety a stupnice

- palety dané přirozeně *(mapa)*
- sémantická rezonance
- kulturní rozměr barvy

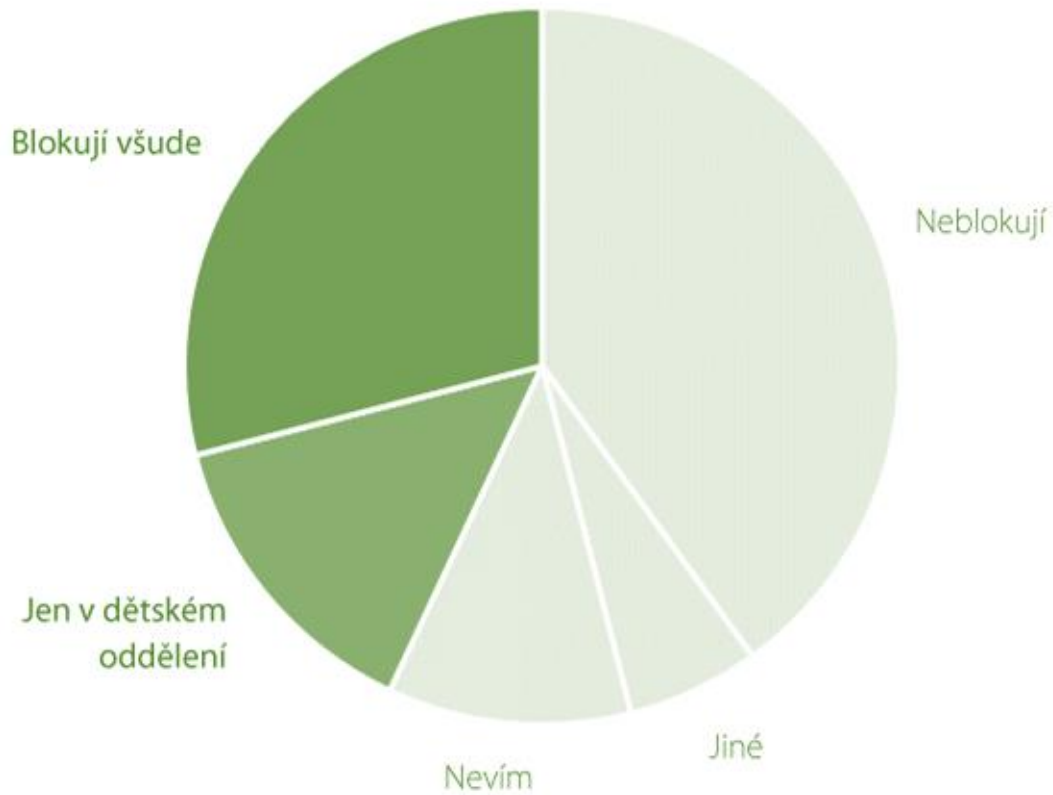
Nevhodný obsah blokuje 43 % knihoven



Graf č. 1 Blokování nevhodného obsahu v knihovnách.

14 % ze zkoumaných knihoven blokuje nevhodný obsah pouze v dětském oddělení. 29 % blokuje nevhodný obsah napříč všemi odděleními.

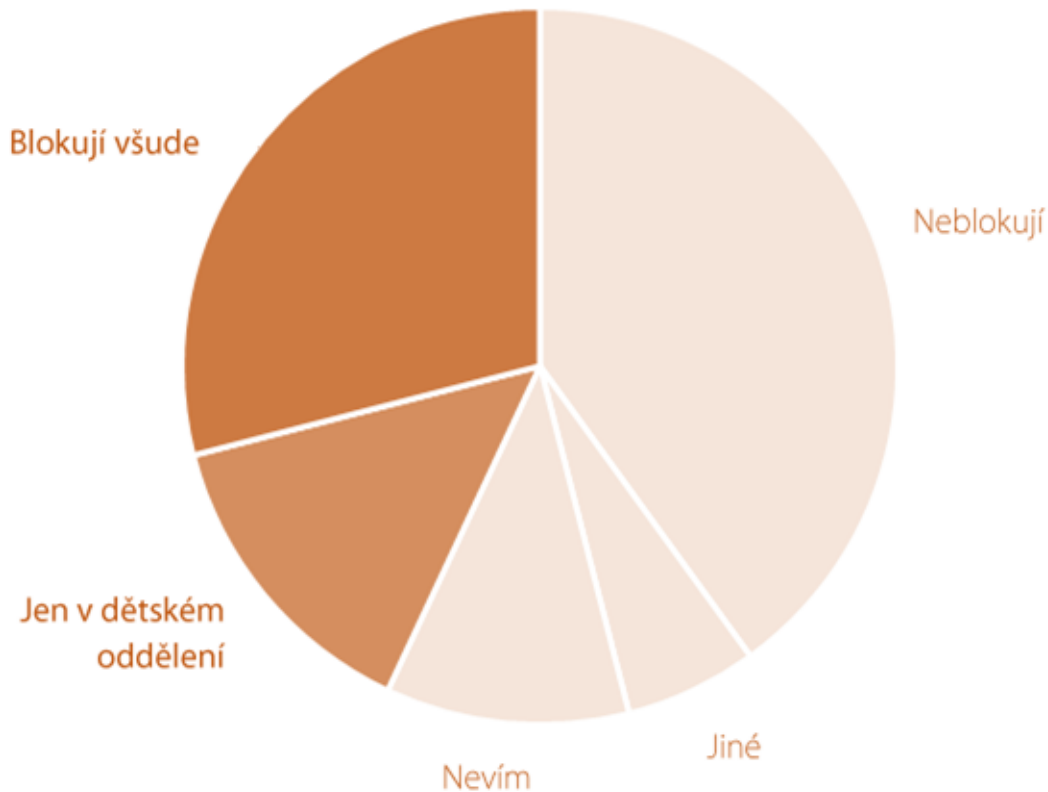
Nevhodný obsah blokuje 43 % knihoven



Graf č. 1 Blokování nevhodného obsahu v knihovnách.

14 % ze zkoumaných knihoven blokuje nevhodný obsah pouze v dětském oddělení. 29 % blokuje nevhodný obsah napříč všemi odděleními.

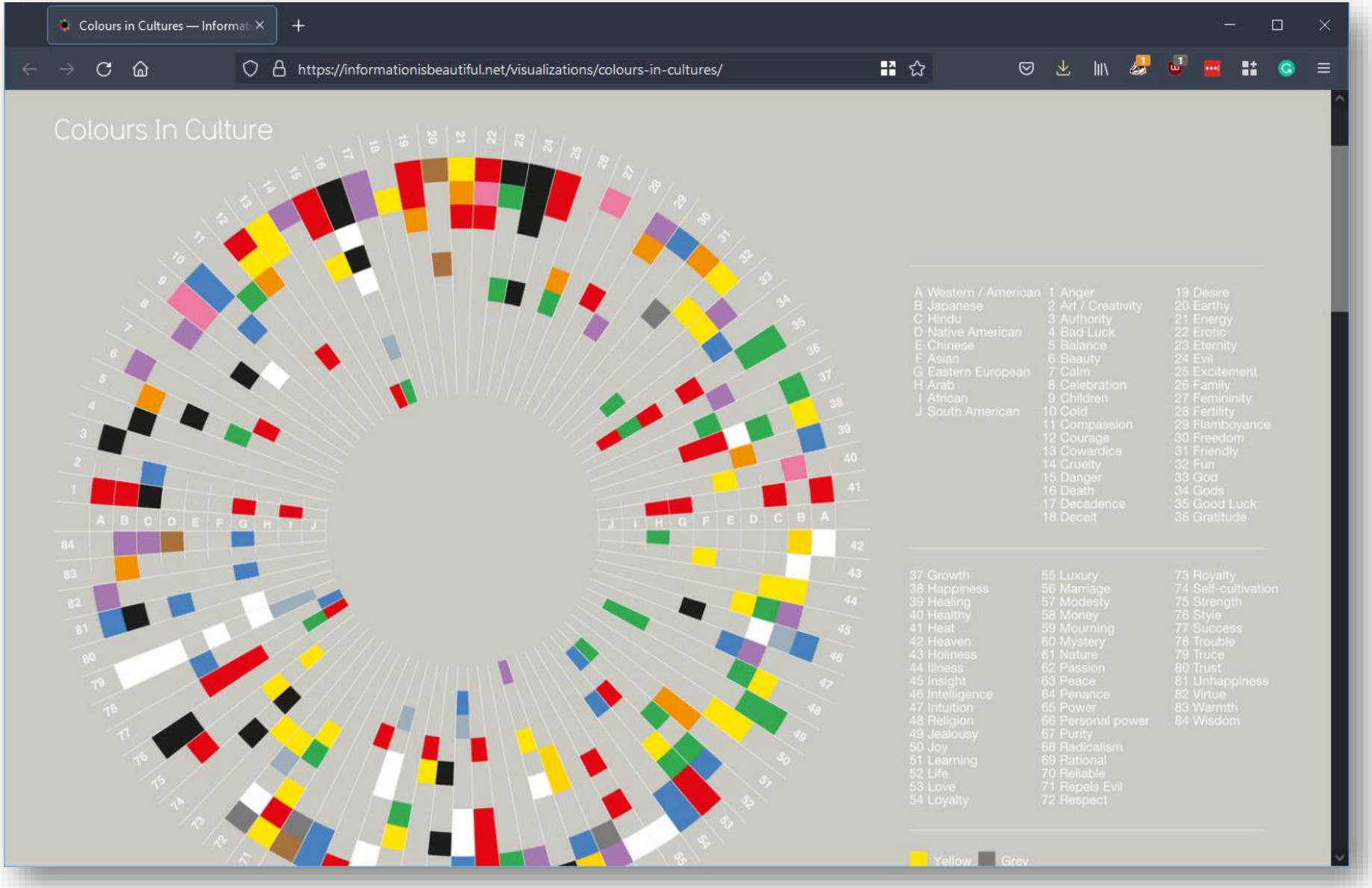
Nevhodný obsah blokuje 43 % knihoven



Graf č. 1 Blokování nevhodného obsahu v knihovnách.

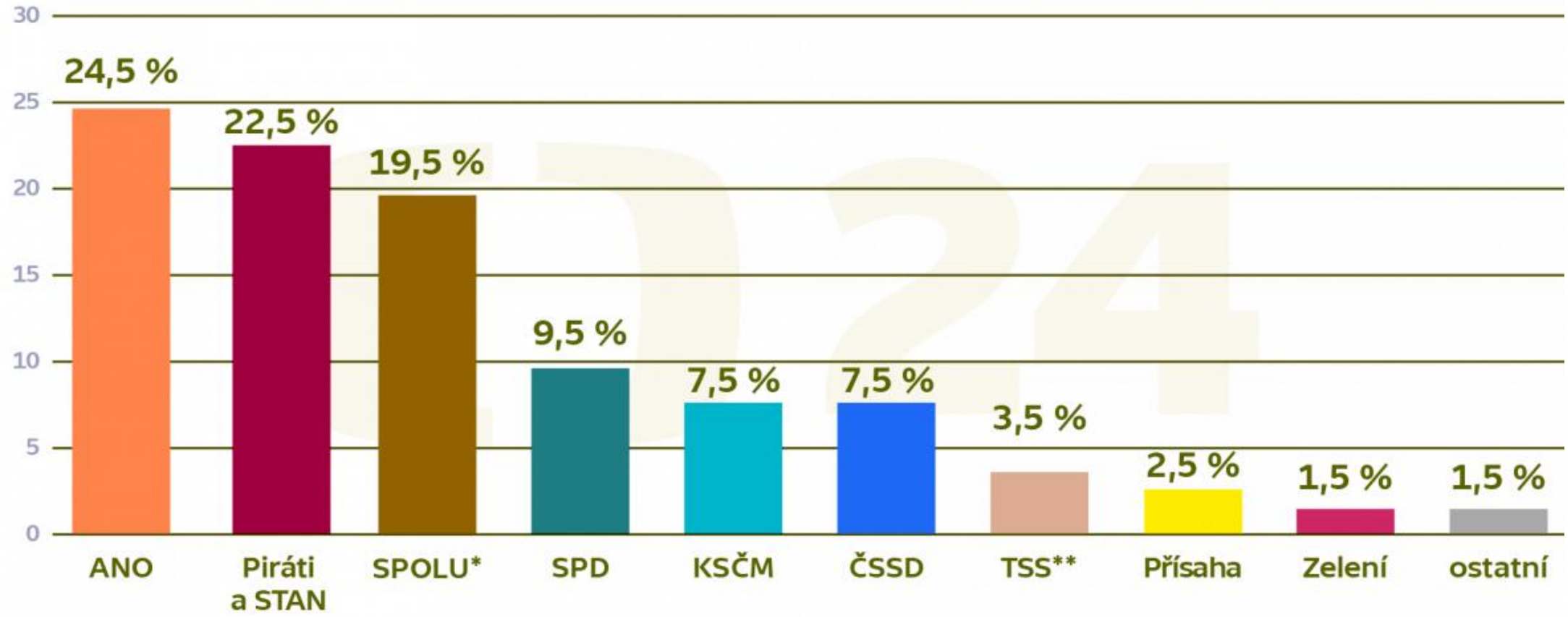
14 % ze zkoumaných knihoven blokuje nevhodný obsah pouze v dětském oddělení. 29 % blokuje nevhodný obsah napříč všemi odděleními.

Smutek a smrt


Colours in Cultures — Informat
https://informationisbeautiful.net/visualizations/colours-in-cultures/
Colours In Culture
A Western / American
B Japanese
C Hindu
D Native American
E Chinese
F Asian
G Eastern European
H Arab
I African
J South American
1 Anger
2 Art / Creativity
3 Authority
4 Bad Luck
5 Balance
6 Beauty
7 Calm
8 Celebration
9 Children
10 Cold
11 Compassion
12 Courage
13 Cowardice
14 Cruelty
15 Danger
16 Death
17 Decadence
18 Deceit
19 Desire
20 Earthy
21 Energy
22 Erotic
23 Eternity
24 Evil
25 Excitement
26 Family
27 Femininity
28 Fertility
29 Flamboyance
30 Freedom
31 Friendly
32 Fun
33 God
34 Gods
35 Good Luck
36 Gratitude
37 Growth
38 Happiness
39 Healing
40 Healthy
41 Heat
42 Heaven
43 Holiness
44 Illness
45 Insight
46 Intelligence
47 Intuition
48 Religion
49 Jealousy
50 Joy
51 Learning
52 Life
53 Love
54 Loyalty
55 Luxury
56 Marriage
57 Modesty
58 Money
59 Mourning
60 Mystery
61 Nature
62 Passion
63 Peace
64 Penance
65 Power
66 Personal power
67 Purity
68 Radicalism
69 Rational
70 Reliable
71 Repels Evil
72 Respect
73 Royalty
74 Self-cultivation
75 Strength
76 Style
77 Success
78 Trouble
79 Truce
80 Trust
81 Unhappiness
82 Virtue
83 Warmth
84 Wisdom
Yellow
Grey

Volební model – červen 2021

www.ct24.cz

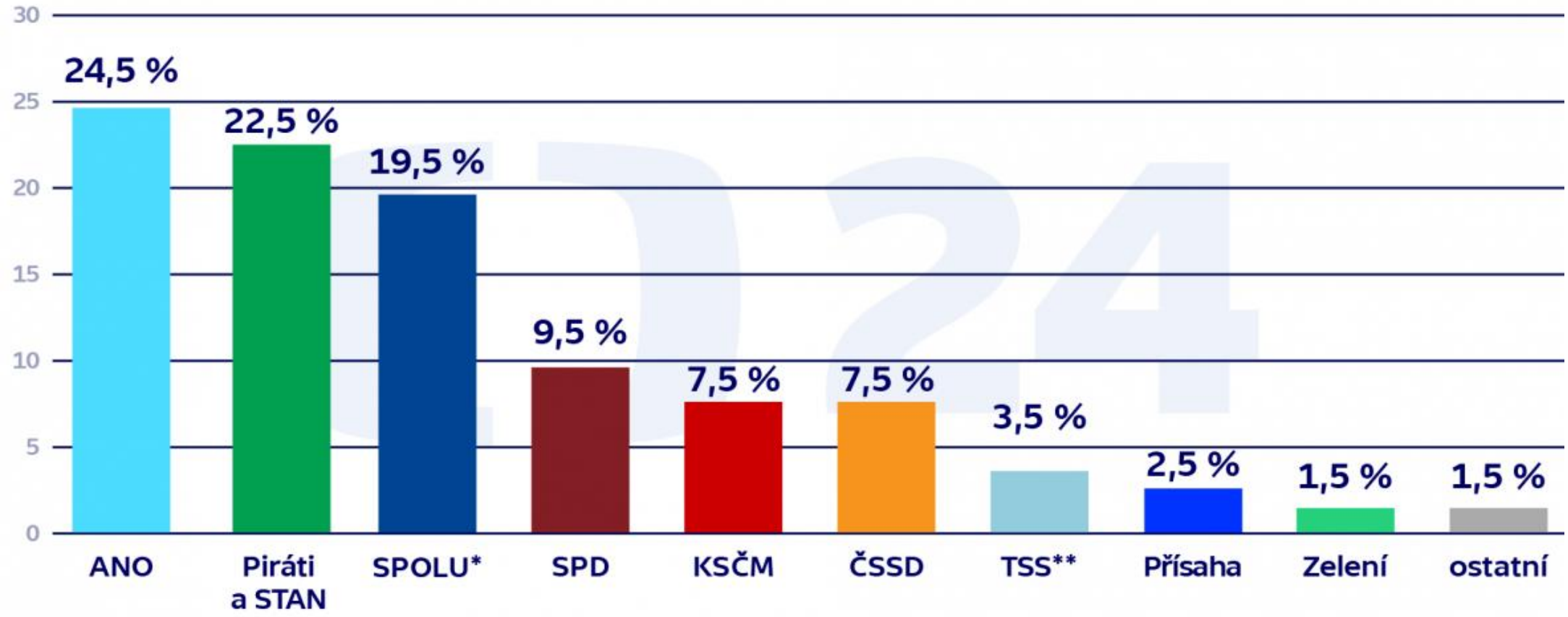


*ODS, KDU-ČSL, TOP 09 **Trikolora Svobodní Soukromníci

Zdroj: CVVM

Volební model – červen 2021

www.ct24.cz



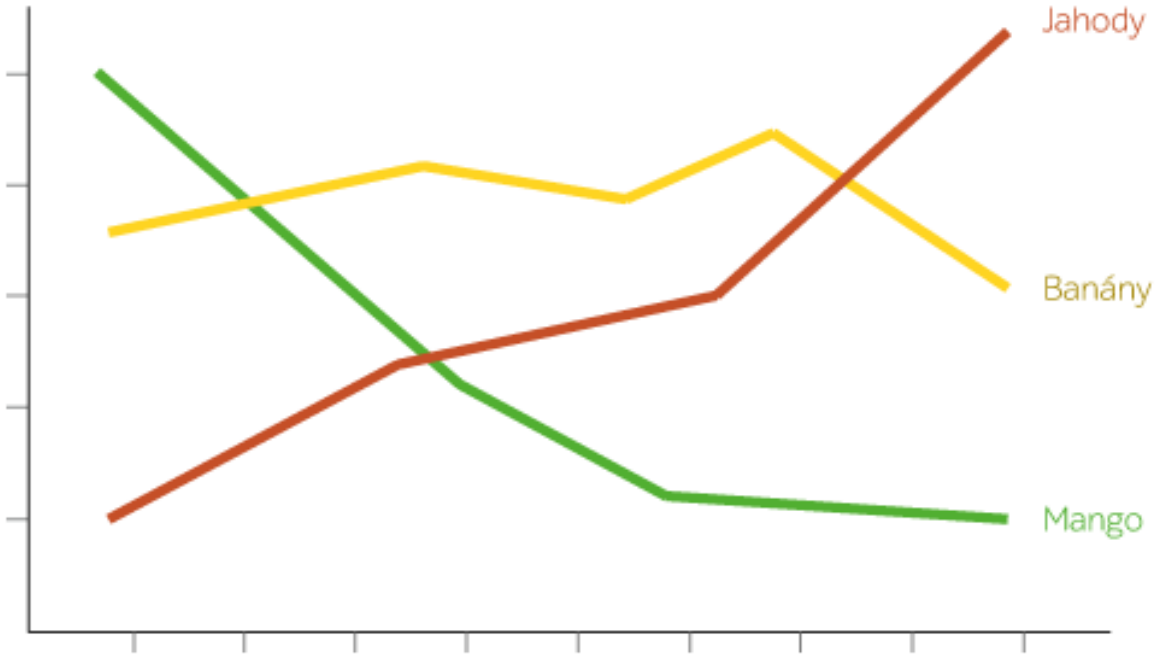
*ODS, KDU-ČSL, TOP 09 **Trikolora Svobodní Soukromníci

Zdroj: CVVM

sémantická rezonance

DOI: 10.1111/cgf.12127

sémantická rezonance

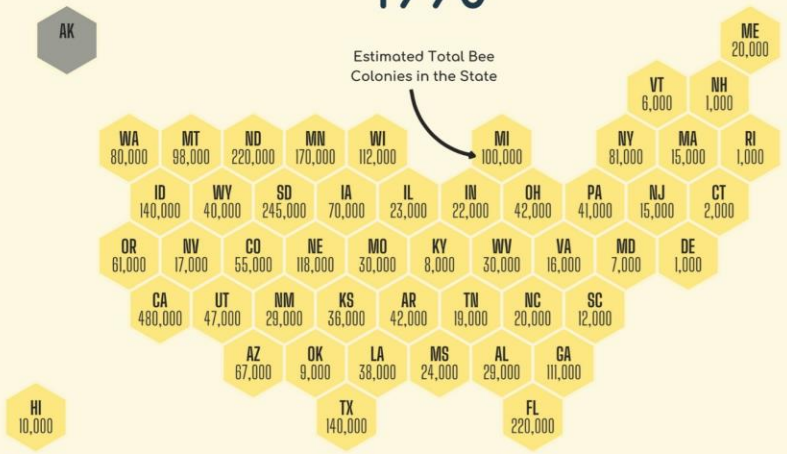


DOI: 10.1111/cgf.12127

The Rise and Fall and Bee Colonies

Maps show percentage change in number of estimated bee colonies compared to 1990

1990



2000

2010

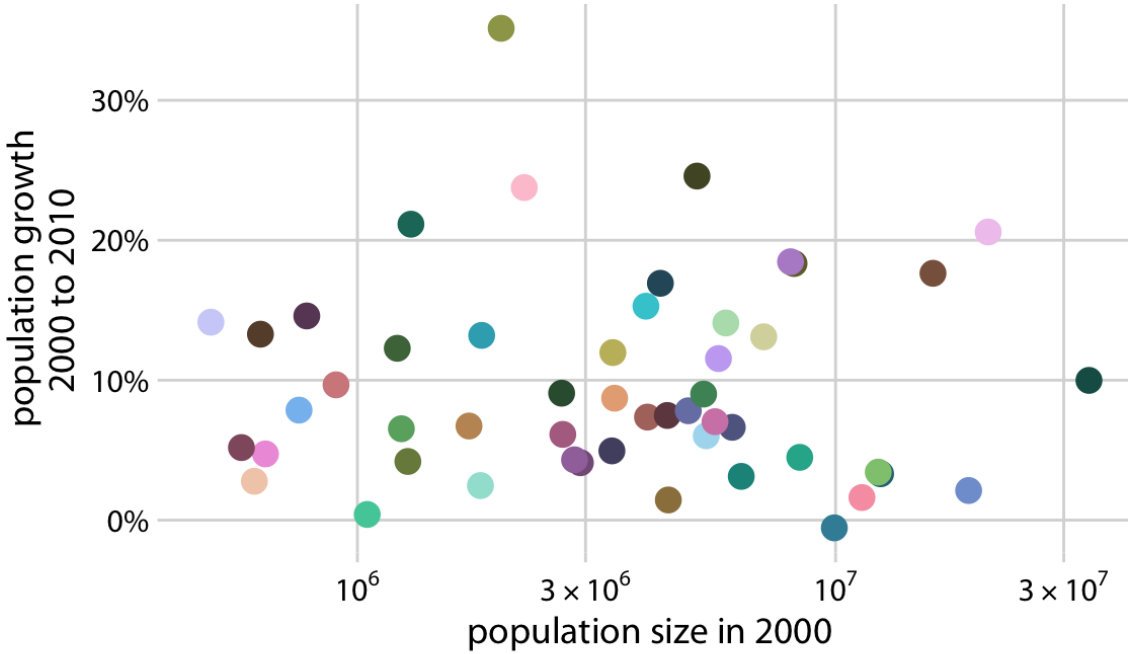
2020

Barevné stupnice

- Kvalitativní (nominální měřítko) – paleta
- Kvantitativní

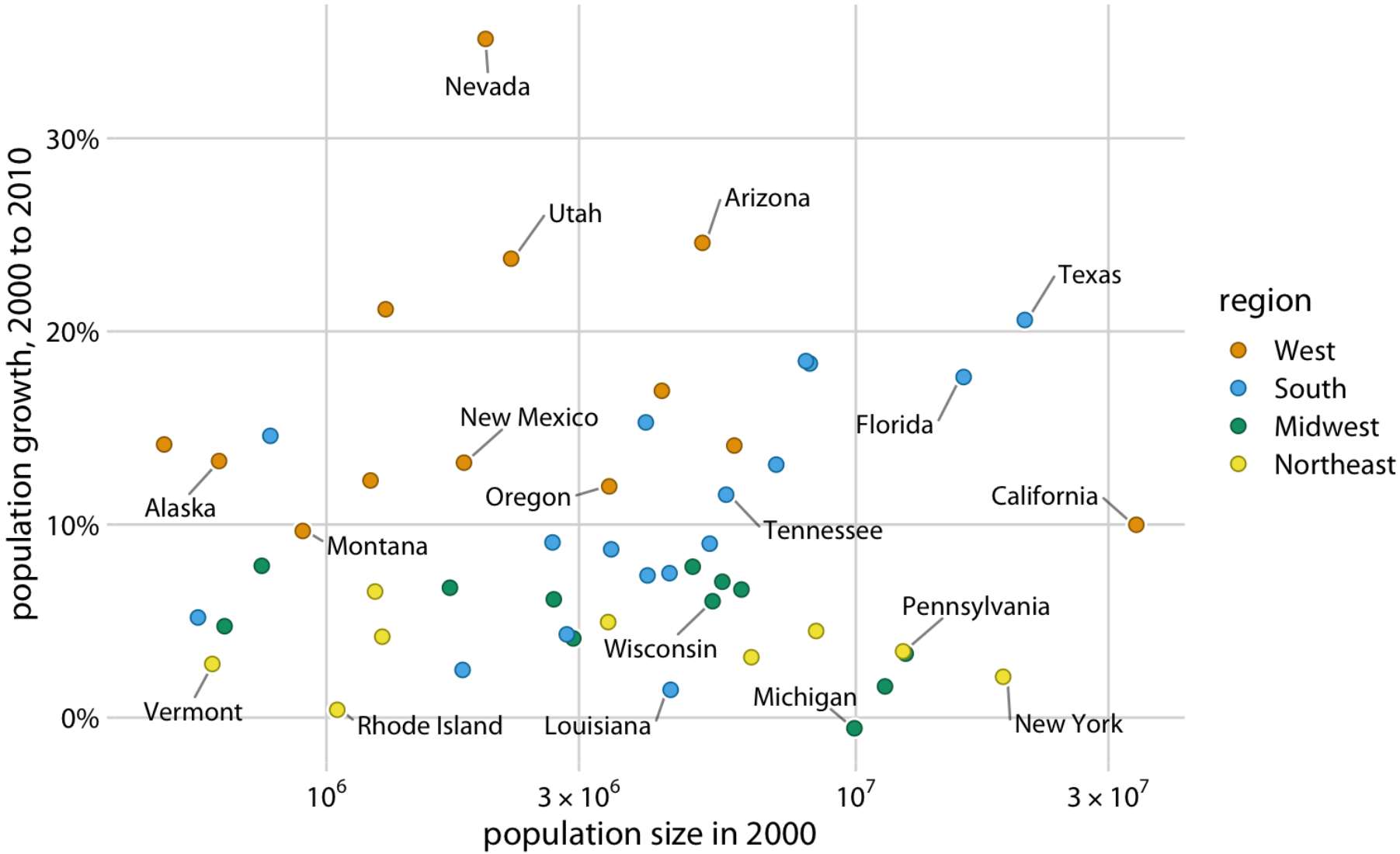
Kvalitativní paleta

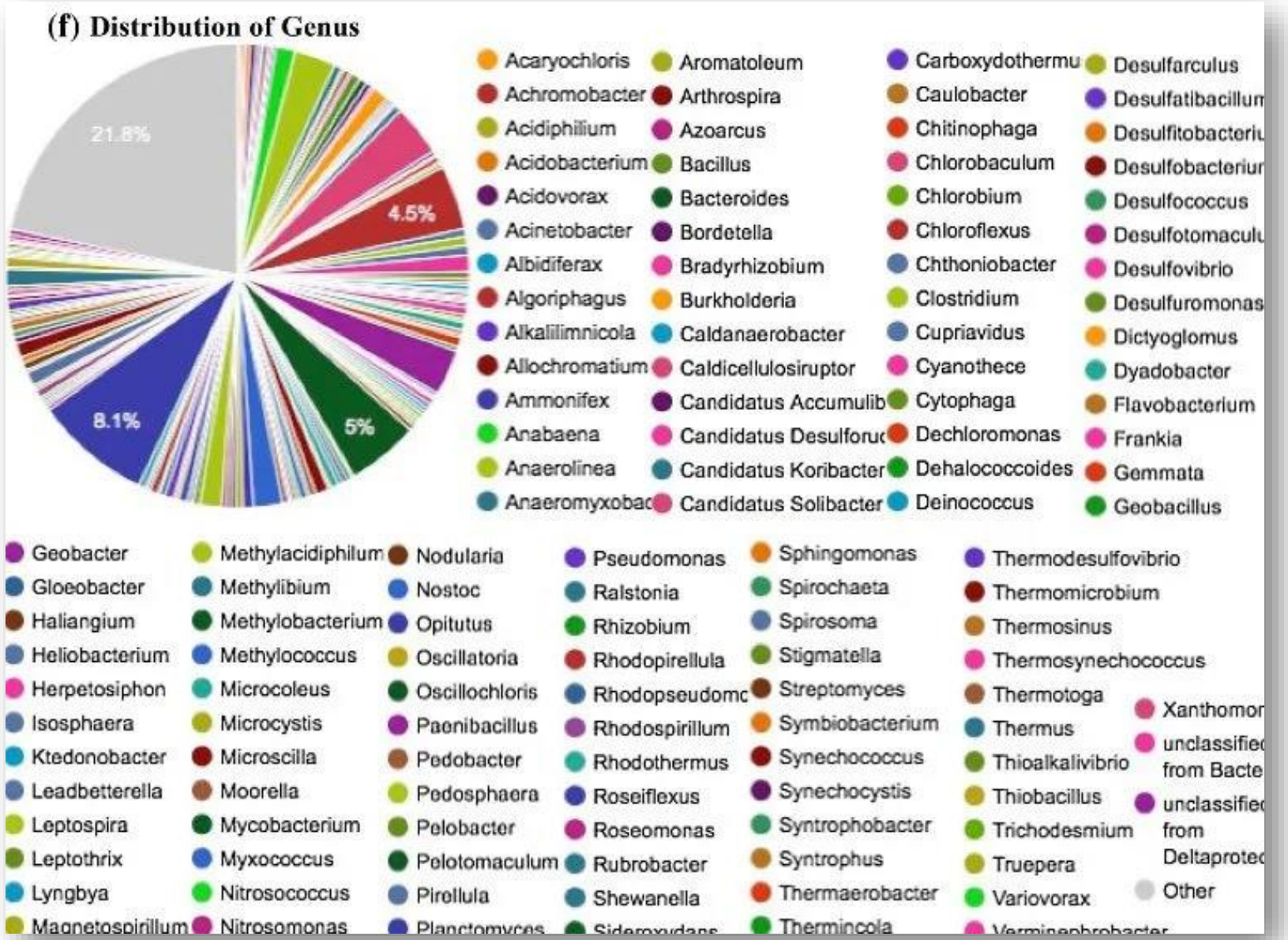
- cíl: absolutní rozlišitelnost
- nejvzdálenější v HCL prostoru
- limit: 12 *(?)*
- monochromatická paleta někdy lepší řešení…
- Excel
- negativa?



state

- Alabama
- Alaska
- Arizona
- Arkansas
- California
- Colorado
- Connecticut
- Delaware
- District of Columbia
- Florida
- Georgia
- Hawaii
- Idaho
- Illinois
- Indiana
- Iowa
- Kansas
- Kentucky
- Louisiana
- Maine
- Maryland
- Massachusetts
- Michigan
- Minnesota
- Mississippi
- Missouri
- Montana
- Nebraska
- Nevada
- New Hampshire
- New Jersey
- New Mexico
- New York
- North Carolina
- North Dakota
- Ohio
- Oklahoma
- Oregon
- Pennsylvania
- Rhode Island
- South Carolina
- South Dakota
- Tennessee
- Texas
- Utah
- Vermont
- Virginia
- Washington
- West Virginia
- Wisconsin
- Wyoming


Nevada
Utah
Arizona
Texas
Florida
New Mexico
Alaska
Oregon
California
Tennessee
Montana
Pennsylvania
Wisconsin
Michigan
Vermont
Rhode Island
Louisiana
New York
30%
20%
10%
0%
population growth, 2000 to 2010
10^6
3×10^6
10^7
3×10^7
population size in 2000
region
West
South
Midwest
Northeast


(f) Distribution of Genus
21.8%
4.5%
8.1%
5%
Acaryochloris
Achromobacter
Acidiphilium
Acidobacterium
Acidovorax
Acinetobacter
Albidiferax
Algoriphagus
Alkalilimnicola
Allochromatium
Ammonifex
Anabaena
Anaerolinea
Anaeromyxobac
Aromatoleum
Arthrospira
Azoarcus
Bacillus
Bacteroides
Bordetella
Bradyrhizobium
Burkholderia
Caldanaerobacter
Caldicellulosiruptor
Candidatus Accumulib
Candidatus Desulforuc
Candidatus Koribacter
Candidatus Solibacter
Carboxydothermu
Caulobacter
Chitinophaga
Chlorobaculum
Chlorobium
Chloroflexus
Chthoniobacter
Clostridium
Cupriavidus
Cyanothece
Cytophaga
Dechloromonas
Dehalococcoides
Deinococcus
Desulfarculus
Desulfatibacillum
Desulfitobacteriu
Desulfobacterium
Desulfococcus
Desulfotomaculu
Desulfovibrio
Desulfuromonas
Dictyoglomus
Dyadobacter
Flavobacterium
Frankia
Gemmata
Geobacillus
Geobacter
Gloeobacter
Haliangium
Heliobacterium
Herpetosiphon
Isosphaera
Ktedonobacter
Leadbetterella
Leptospira
Leptothrix
Lyngbya
Magnetospirillum
Methylacidiphilum
Methylibium
Methylobacterium
Methylococcus
Microcoleus
Microcystis
Microscilla
Moorella
Mycobacterium
Myxococcus
Nitrosococcus
Nitrosomonas
Nodularia
Nostoc
Opitutus
Oscillatoria
Oscillochloris
Paenibacillus
Pedobacter
Pedosphaera
Pelobacter
Pelotomaculum
Pirellula
Planctomyces
Pseudomonas
Ralstonia
Rhizobium
Rhodopirellula
Rhodopseudomc
Rhodospirillum
Rhodothermus
Roseiflexus
Roseomonas
Rubrobacter
Shewanella
Sideroxydans
Sphingomonas
Spirochaeta
Spirosoma
Stigmatella
Streptomyces
Symbiobacterium
Synechococcus
Synechocystis
Syntrophobacter
Syntrophus
Thermaerobacter
Thermincola
Thermodesulfovibrio
Thermomicrobium
Thermosinus
Thermosynechococcus
Thermotoga
Thermus
Thioalkalivibrio
Thiobacillus
Trichodesmium
Truepera
Variovorax
Verminephrobacter
Xanthomon
unclassifie
from Bacte
unclassifie
from
Deltaprotec
Other

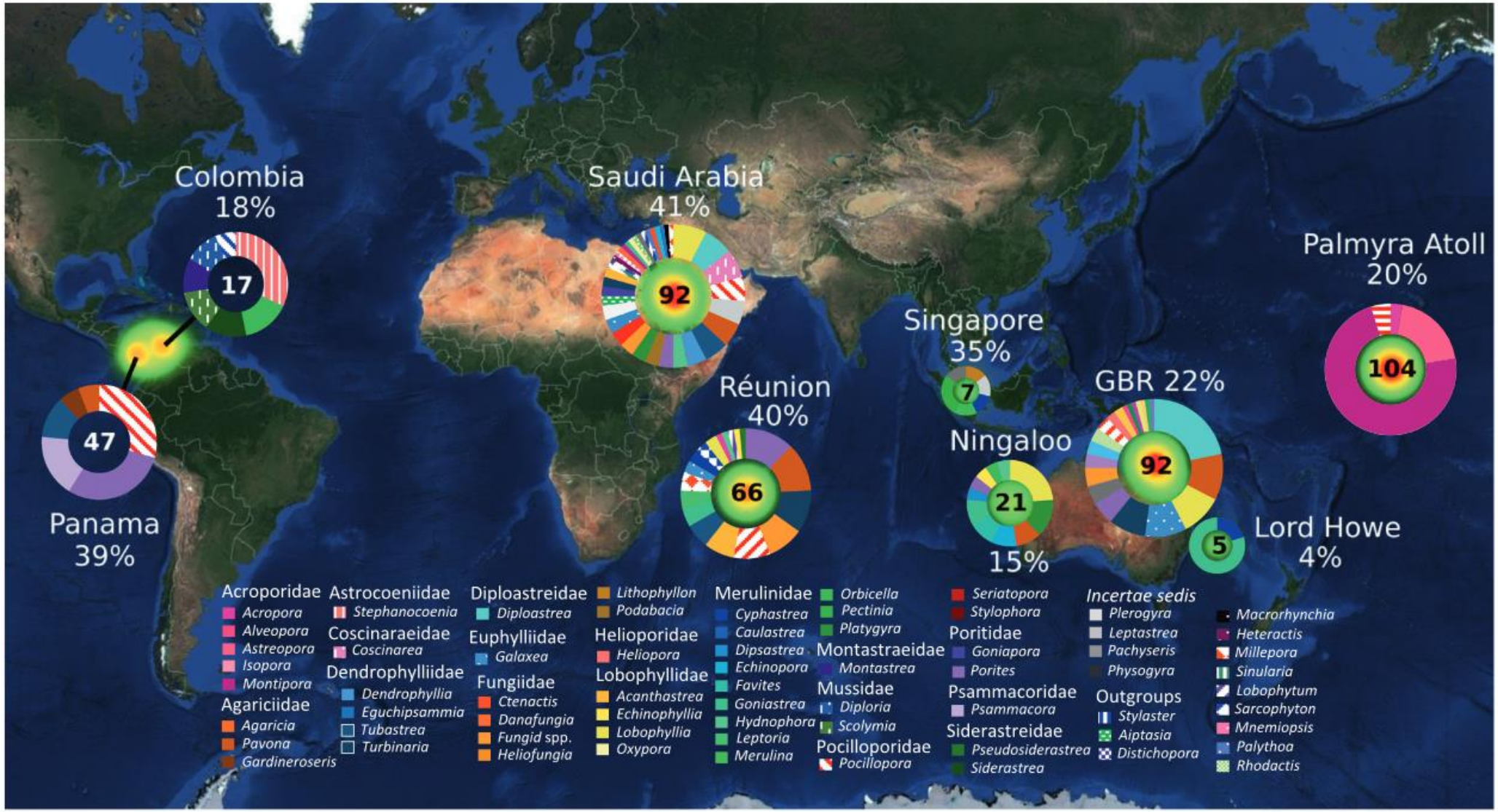
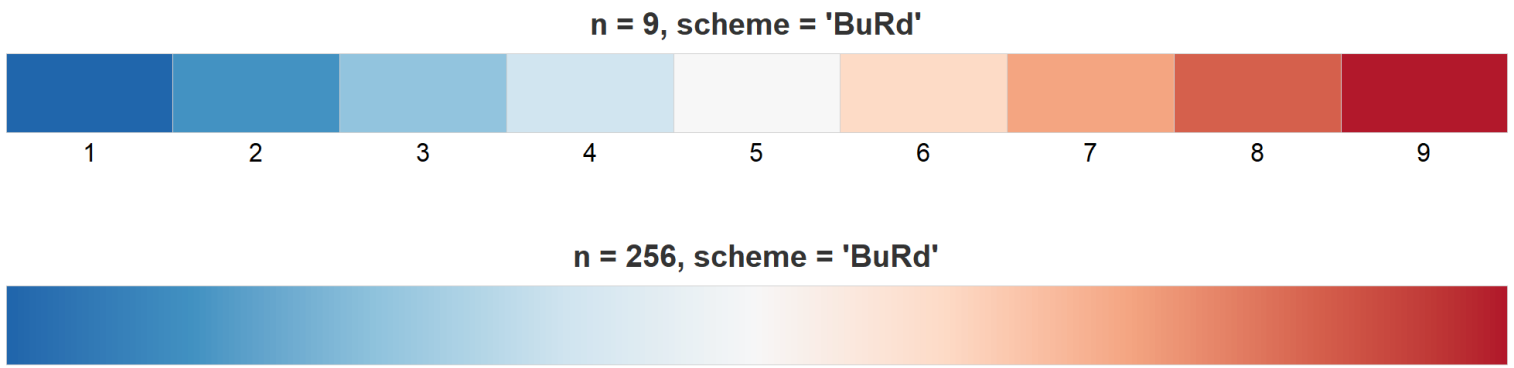
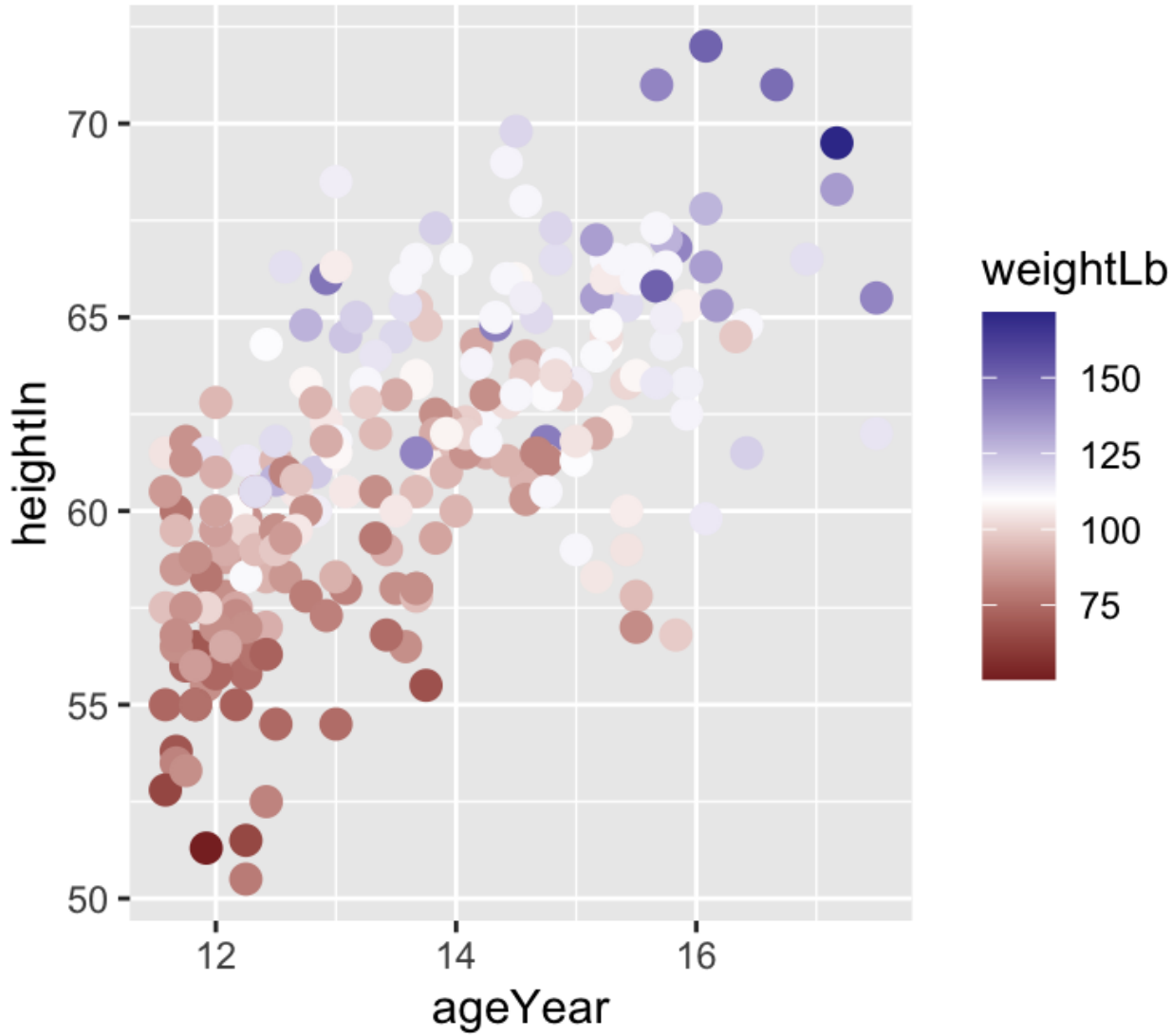


Fig. 7 Map of the distribution of "*Ca.* A. rohweri" in coral and cnidarian outgroups. Coral samples included in map were from the Global Coral Microbiome Project (EMP Study ID 10895) and Palmyra Atoll Corallimorph and Bleaching Surveys (EMP Study ID 10798), a total of 451 samples. Ring charts show the number of samples (numeral inside ring) and the different coral host genera (exterior colored bars) in which "*Ca.* A. rohweri" was present. Percentages indicate the number of coral samples from each geographic location in which "*Ca.* A. rohweri" was identified. "*Ca.* A. rohweri" has also been identified in samples from the Caribbean which were sequenced using a different protocol and therefore not included in this analysis

Kvantitativní stupnice

- plynulá vs intervalová



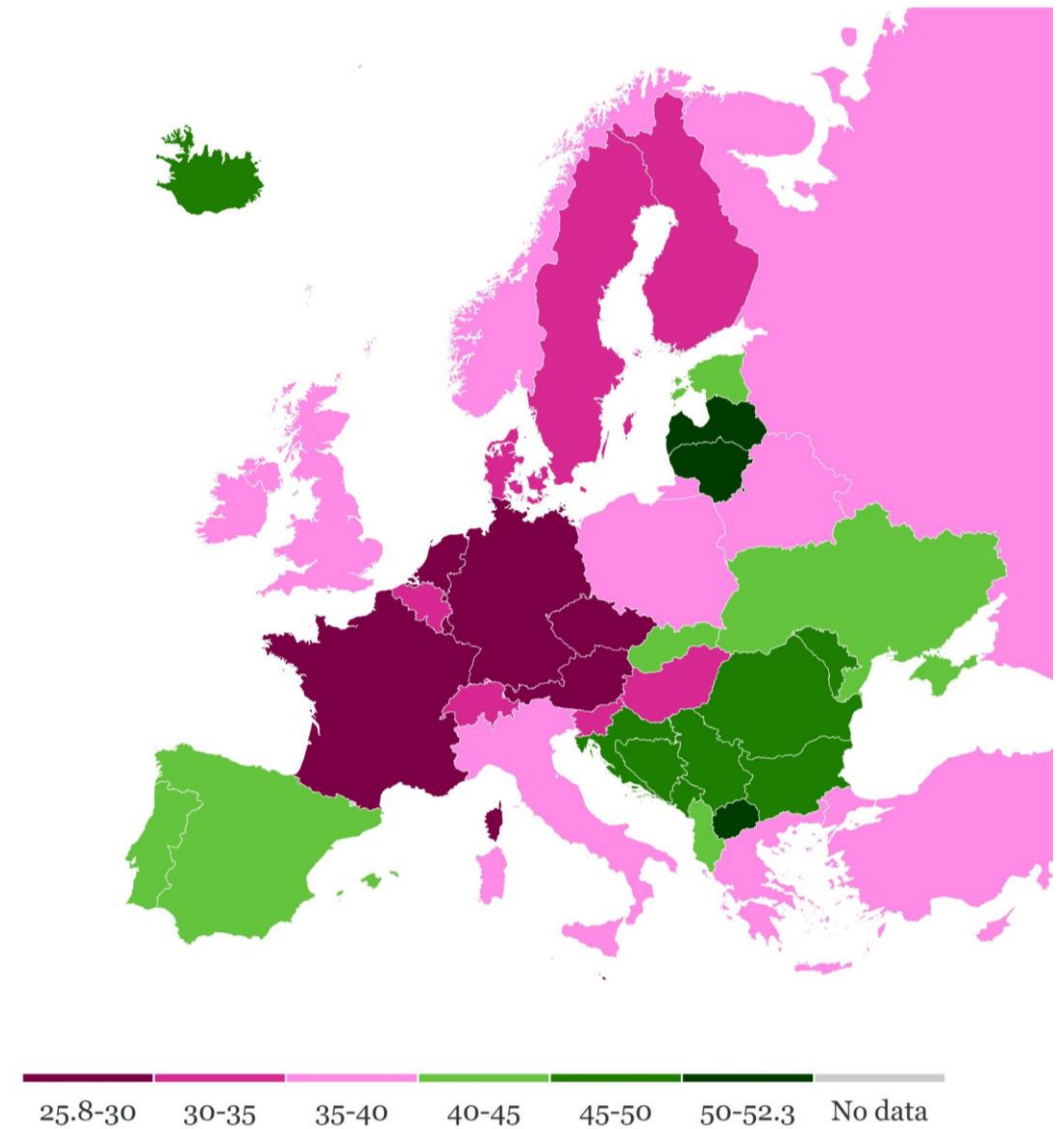

70
65
60
55
50
heightIn
12
14
16
ageYear
weightLb
150
125
100
75

Kvantitativní stupnice

- pravidlo: větší číslo – intenzivnější barva
- divergentní a konvergentní
- *dvoukoncové a jednokoncové*

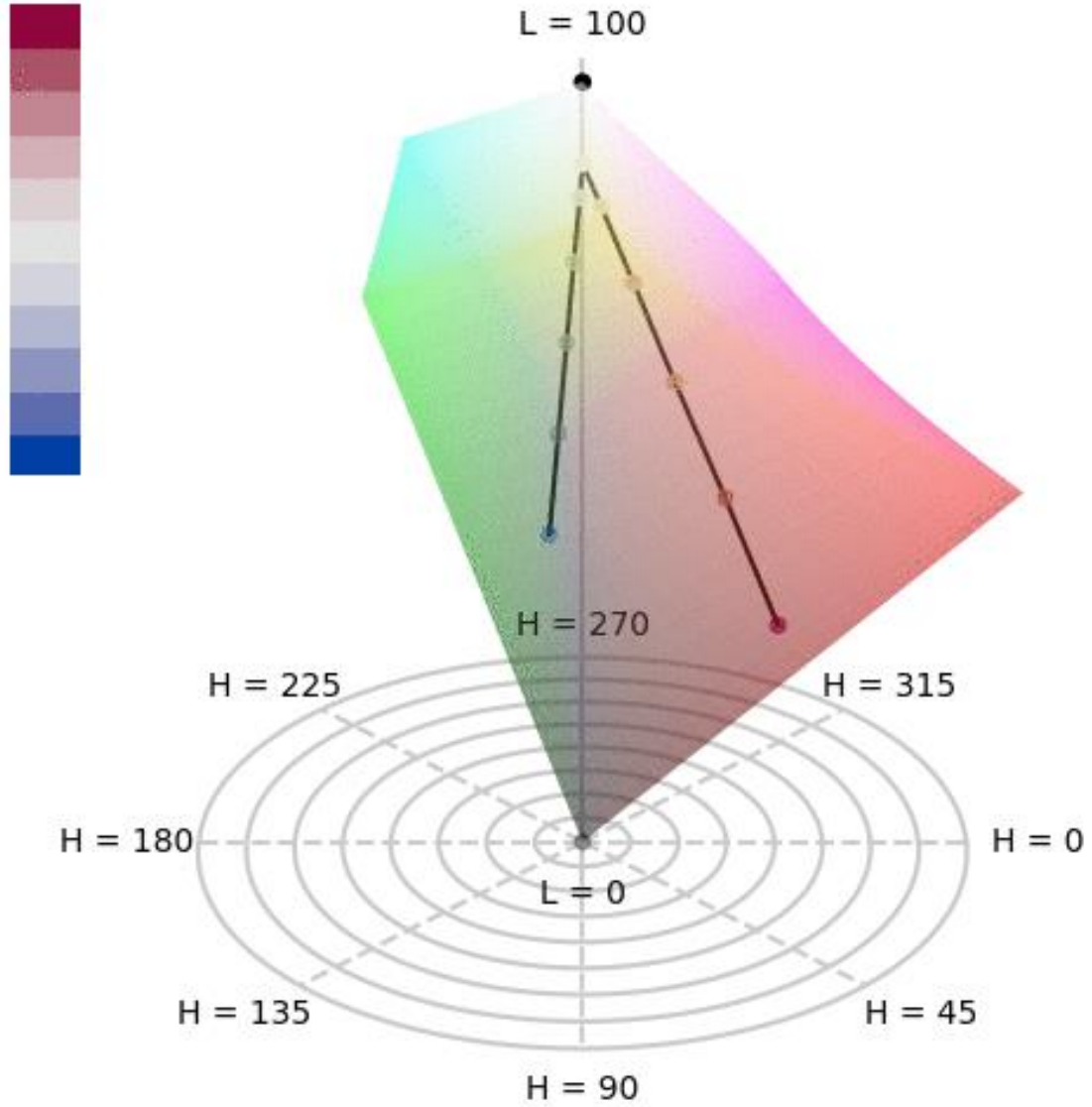
Female researchers as a % of total researchers (2017 or latest year available)

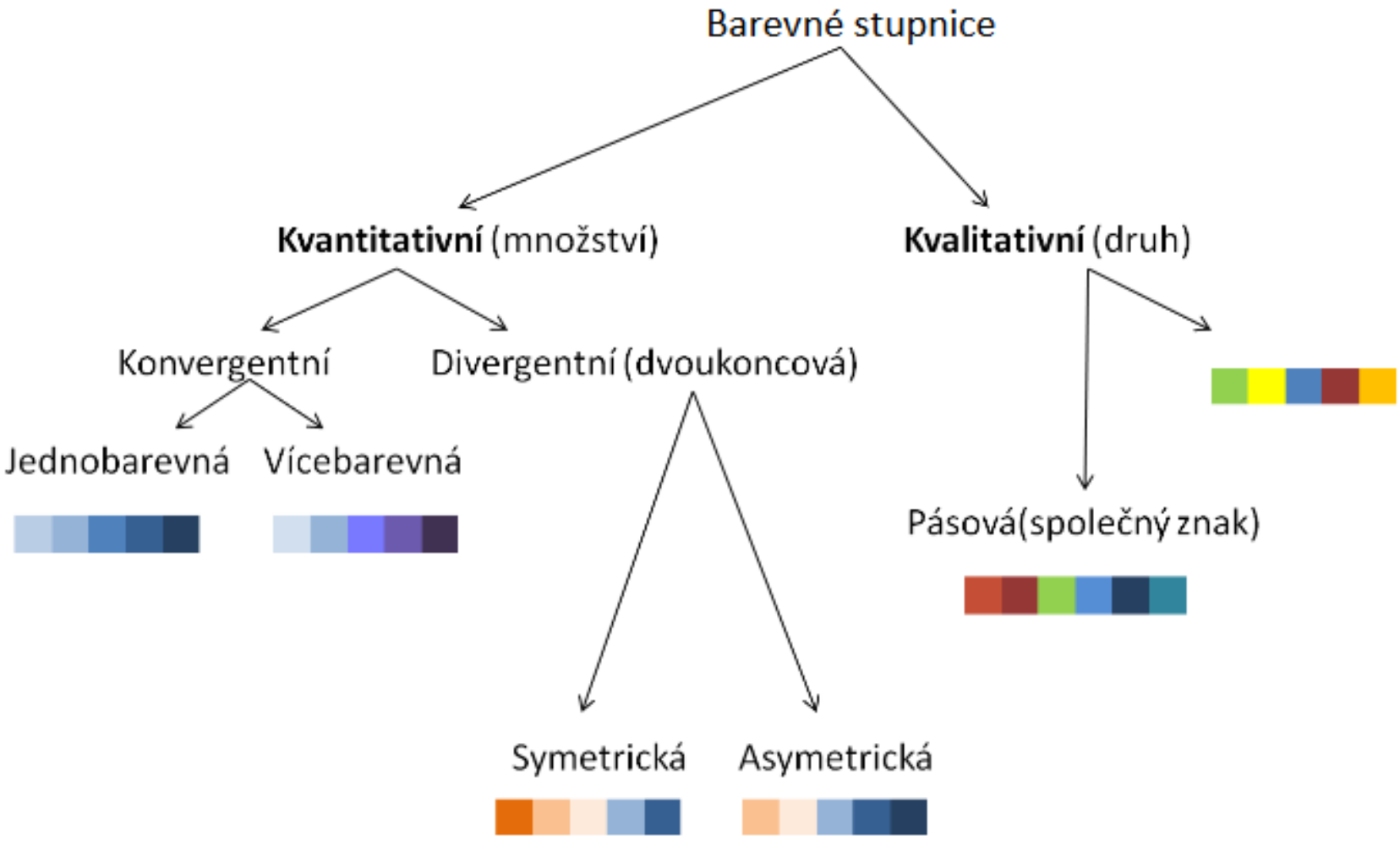
N. Macedonia	52.3
Latvia	52.2
Lithuania	51.6
Serbia	50
Bulgaria	49.1
Moldova	48.5
Croatia	47.7
Montenegro	47.6
Iceland	47.2
BIH	46.8
Romania	45.8
Ukraine	44.7
Albania	44.3
Estonia	43.6
Portugal	43.5
Slovakia	41.4
Spain	40.2
Belarus	39.7
Russia	39.6
UK	38.7
Greece	38
Norway	37.6
Cyprus	37.3
Turkey	37
Poland	36.4
Ireland	35.3
Italy	35.2
Slovenia	34.5
Belgium	34.1
Denmark	33.8
Sweden	33.7
Switzerland	33.6
Finland	32.5
Hungary	30.8
Austria	29.5
Luxembourg	28.9
Malta	28.7
Germany	28
France	27
Czechia	26.8
Netherlands	25.8



Source: UNESCO Institute for Statistics, June 2019.
http://uis.unesco.org/sites/default/files/documents/fs55-women-in-science-2019-en.pdf

divergentní stupnice v HCL

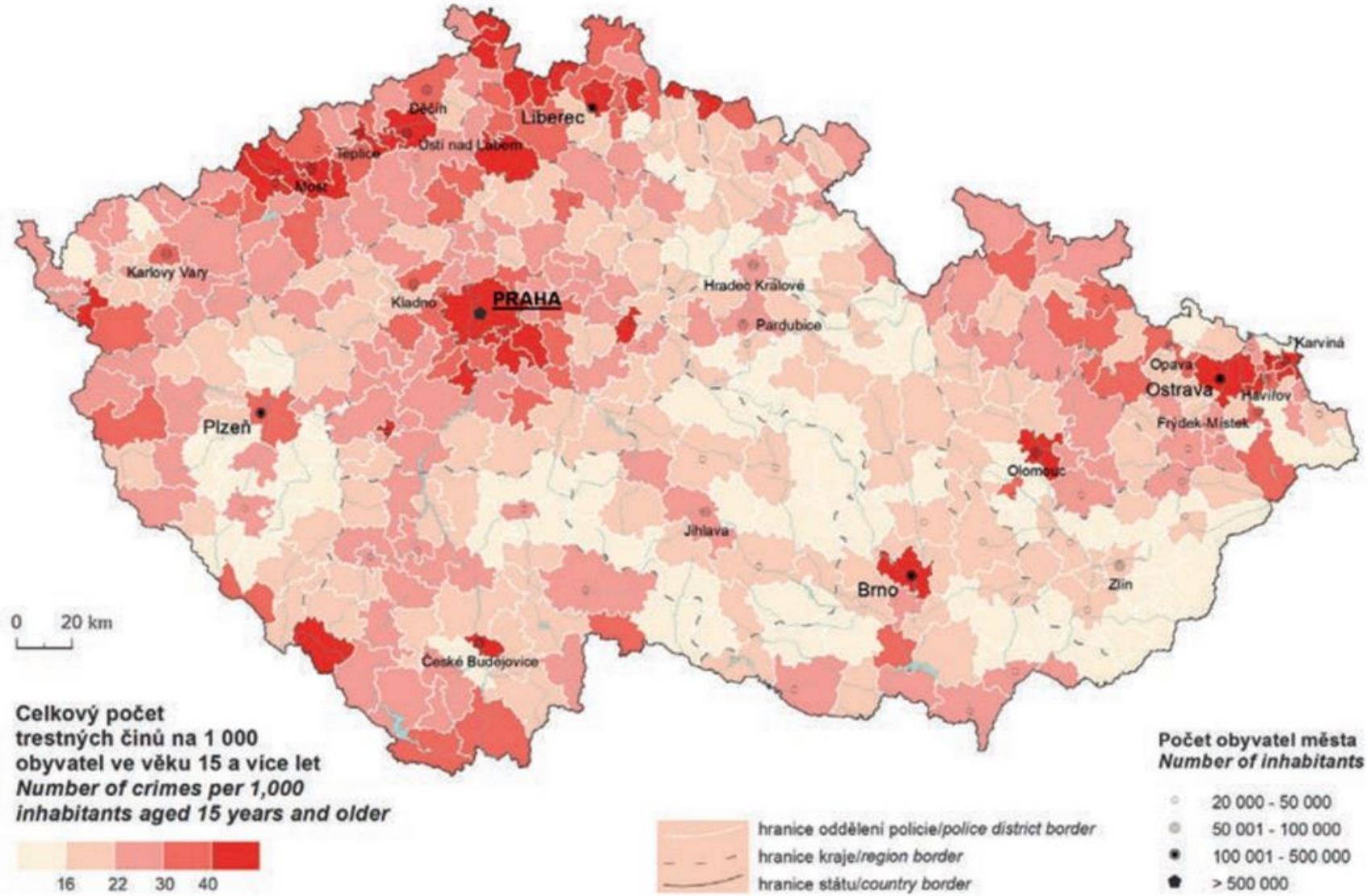




Zdroj: https://dspace5.zcu.cz/bitstream/11025/7135/1/Bakalarka.pdf

Obr 1: Celková kriminalita v Česku v odděleních policie, 2013–2015

Total crime in the Czech Republic by police districts, 2013–2015



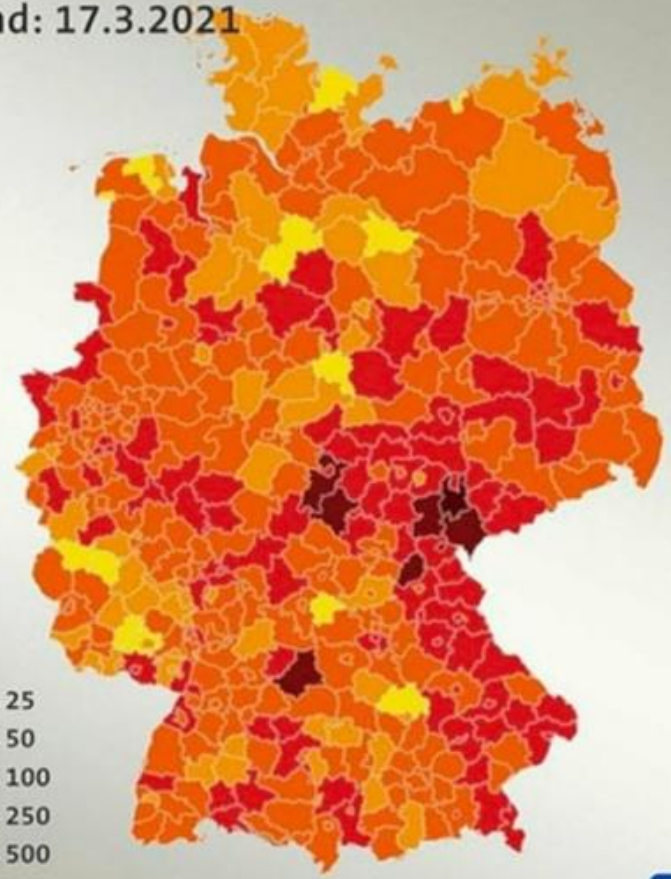
Zdroj: Policejní prezidium ČR (2013–2015), SLDB (2011).

Source: *Police Presidium of the CR (2013–2015), The Population and Housing Census (2011).*

tagesschau

7-Tage-Inzidenzen der Landkreise

Stand: 17.3.2021

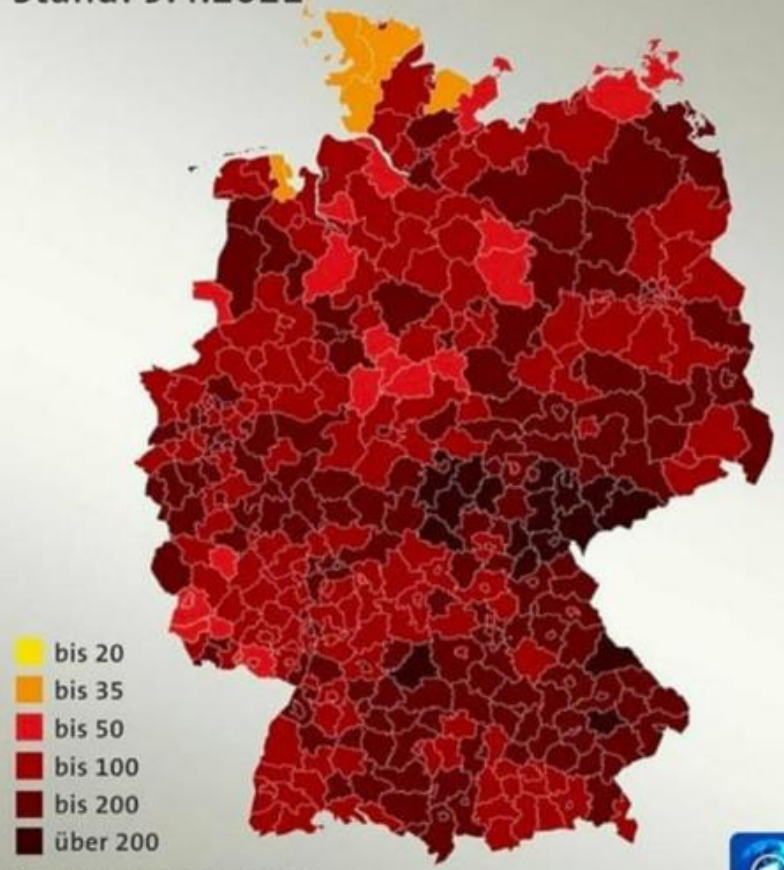


Quelle: Robert Koch-Institut

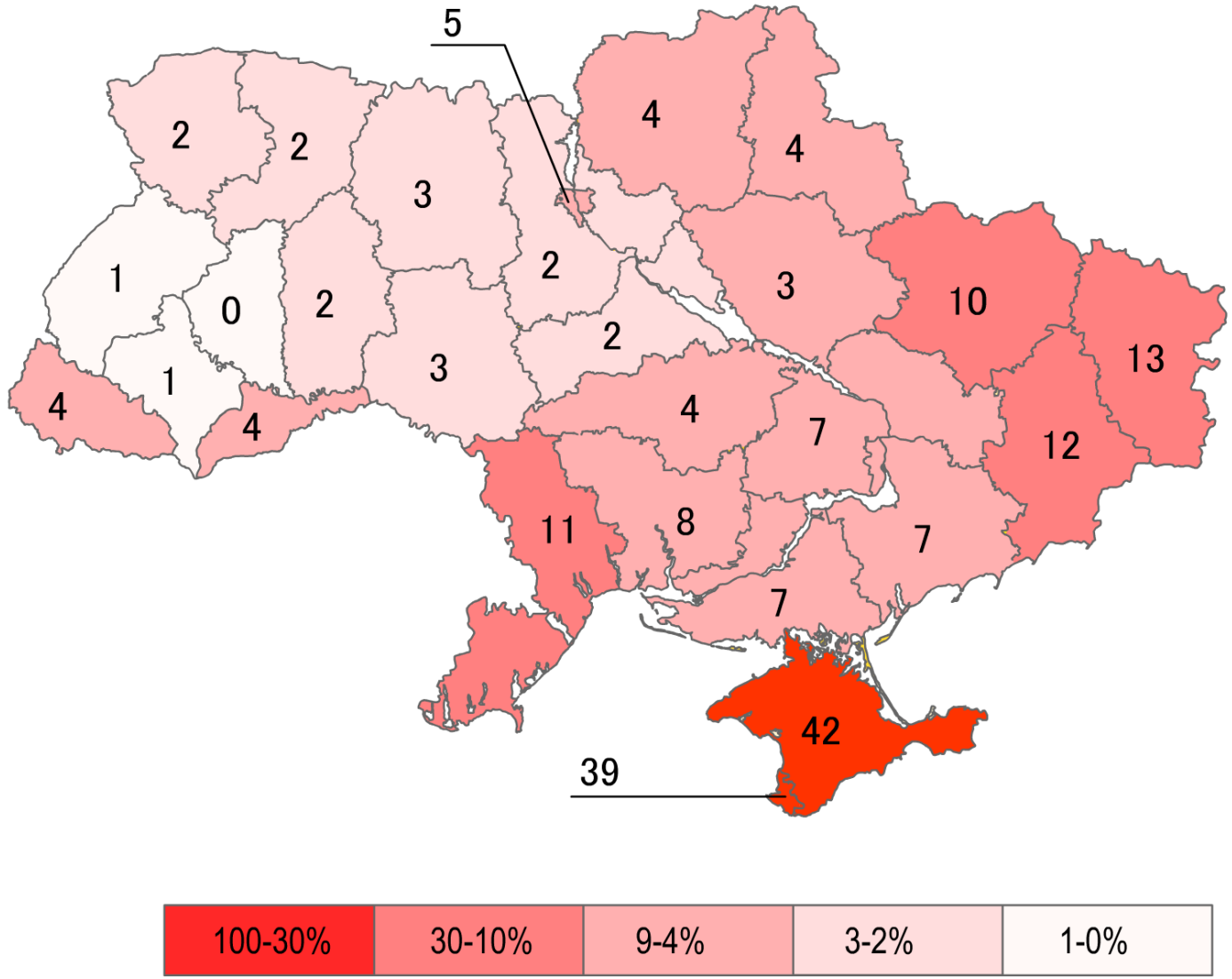
tagesschau

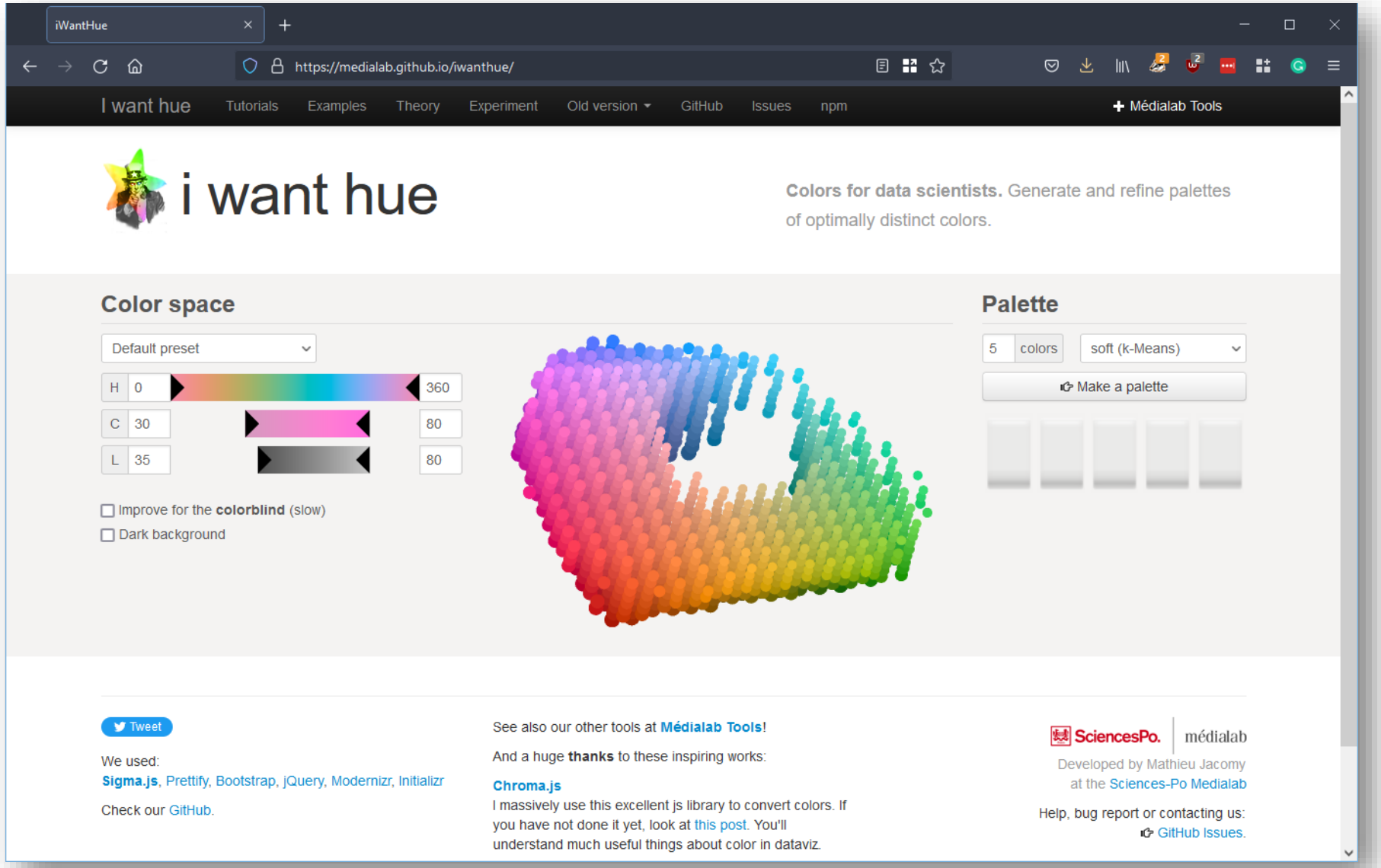
7-Tage-Inzidenzen der Landkreise

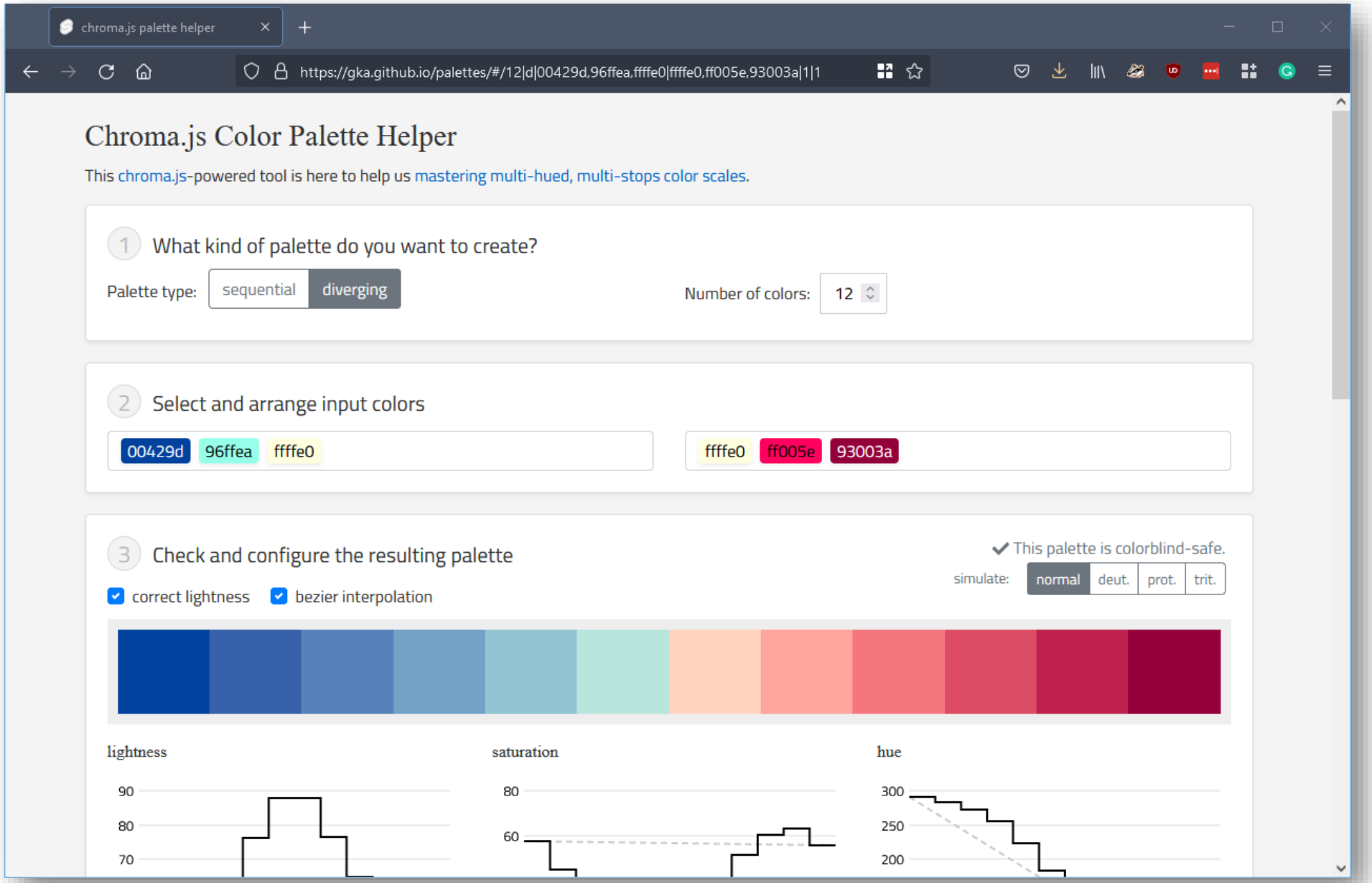
Stand: 9.4.2021

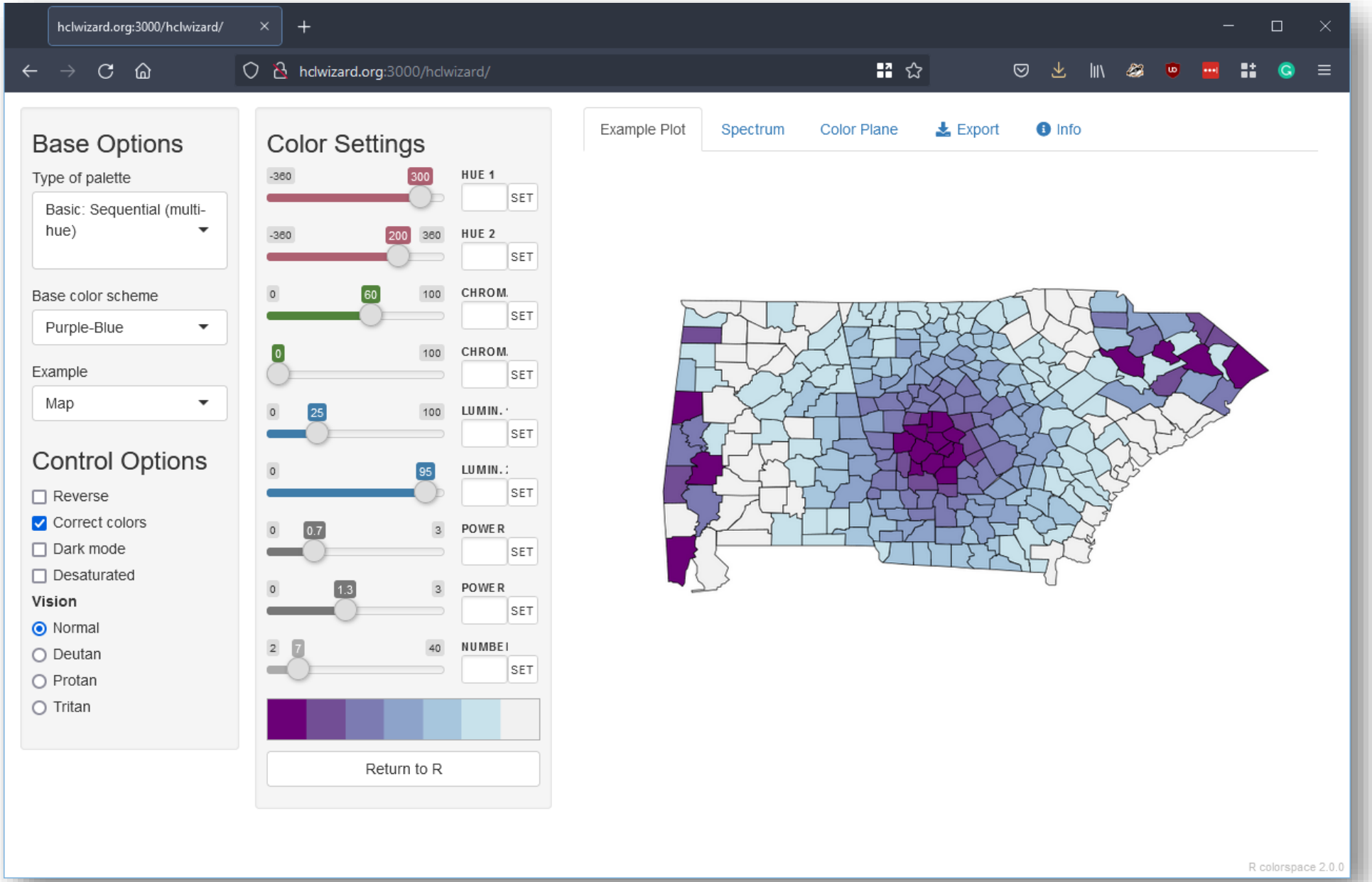


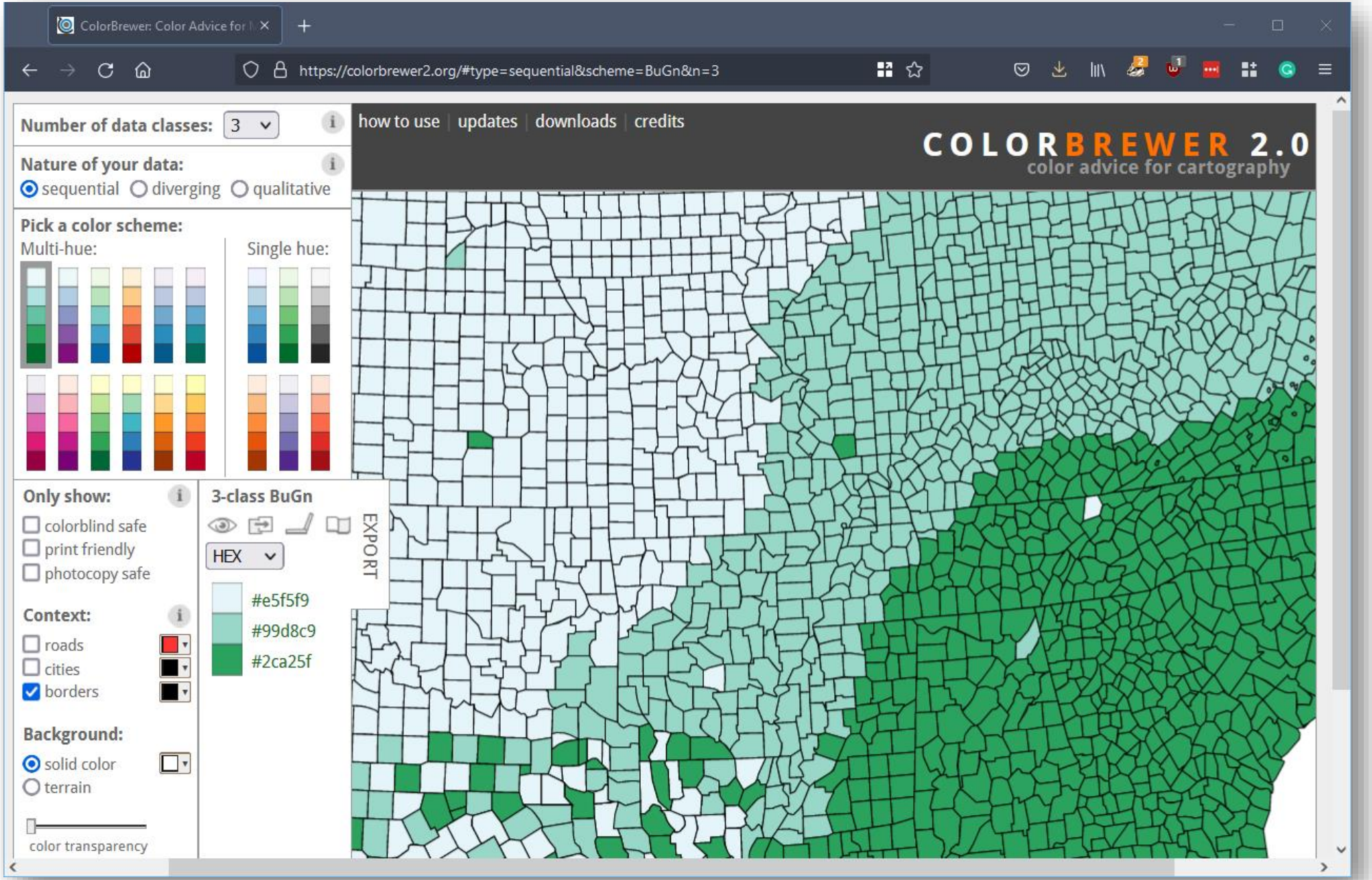
Quelle: Robert Koch-Institut


5
2
2
3
4
4
1
0
2
2
3
10
13
1
3
2
4
4
7
12
11
8
7
7
42
39
100-30%
30-10%
9-4%
3-2%
1-0%


iWantHue
https://medialab.github.io/iwanthue/
I want hue
Tutorials
Examples
Theory
Experiment
Old version
GitHub
Issues
npm
+ Médialab Tools
i want hue
Colors for data scientists. Generate and refine palettes of optimally distinct colors.
Color space
Default preset
H 0 360
C 30 80
L 35 80
Improve for the colorblind (slow)
Dark background
Palette
5 colors
soft (k-Means)
Make a palette
Tweet
We used:
Sigma.js, Prettify, Bootstrap, jQuery, Modernizr, Initializr
Check our GitHub.
See also our other tools at Médialab Tools!
And a huge thanks to these inspiring works:
Chroma.js
I massively use this excellent js library to convert colors. If you have not done it yet, look at this post. You'll understand much useful things about color in dataviz.
SciencesPo. médialab
Developed by Mathieu Jacomy at the Sciences-Po Medialab
Help, bug report or contacting us:
GitHub Issues.


chroma.js palette helper
https://gka.github.io/palettes/#/12|d|00429d,96ffea,ffffe0|ffffe0,ff005e,93003a|1|1
Chroma.js Color Palette Helper
This chroma.js-powered tool is here to help us mastering multi-hued, multi-stops color scales.
1 What kind of palette do you want to create?
Palette type: sequential diverging
Number of colors: 12
2 Select and arrange input colors
00429d 96ffea ffffe0
ffffe0 ff005e 93003a
3 Check and configure the resulting palette
This palette is colorblind-safe.
simulate: normal deut. prot. trit.
correct lightness
bezier interpolation
lightness
saturation
hue
90
80
70
80
60
300
250
200


hclwizard.org:3000/hclwizard/
hclwizard.org:3000/hclwizard/
Base Options
Type of palette
Basic: Sequential (multi-hue)
Base color scheme
Purple-Blue
Example
Map
Control Options
Reverse
Correct colors
Dark mode
Desaturated
Vision
Normal
Deutan
Protan
Tritan
Color Settings
-360
300
HUE 1
SET
-360
200
360
HUE 2
SET
0
60
100
CHROM.
SET
0
100
CHROM.
SET
0
25
100
LUMIN.
SET
0
95
LUMIN.
SET
0
0.7
3
POWER
SET
0
1.3
3
POWER
SET
2
7
40
NUMBE
SET
Return to R
Example Plot
Spectrum
Color Plane
Export
Info
R colorspace 2.0.0


ColorBrewer: Color Advice for
https://colorbrewer2.org/#type=sequential&scheme=BuGn&n=3
Number of data classes: 3
Nature of your data:
sequential
diverging
qualitative
Pick a color scheme:
Multi-hue:
Single hue:
Only show:
colorblind safe
print friendly
photocopy safe
Context:
roads
cities
borders
Background:
solid color
terrain
color transparency
how to use
updates
downloads
credits
COLORBREWER 2.0
color advice for cartography
3-class BuGn
EXPORT
HEX
#e5f5f9
#99d8c9
#2ca25f

Takže...

- barva je silně subjektivní
- její vnímání ovlivňuje i předchozí a kulturní zkušenost
- design pro globální publikum je tak náročný
- design pro lokální publikum úplně stejně
- barvy v Excelu jsou ve výchozí podobě mnohdy nesmysl
- myslíme na základní pravidla a problémy
- k ruce máme arzenál nástrojů