
(My opening Keynote for
the *2017 U.S. Conference on Teaching Statistics*)
Chris Wild
University of Auckland


Introducing co-Presenter
Marcel Marceau
This talk carries a Government Mental Heath Warning
Chris Wild
University of Auckland

Crazy Diamond Productions

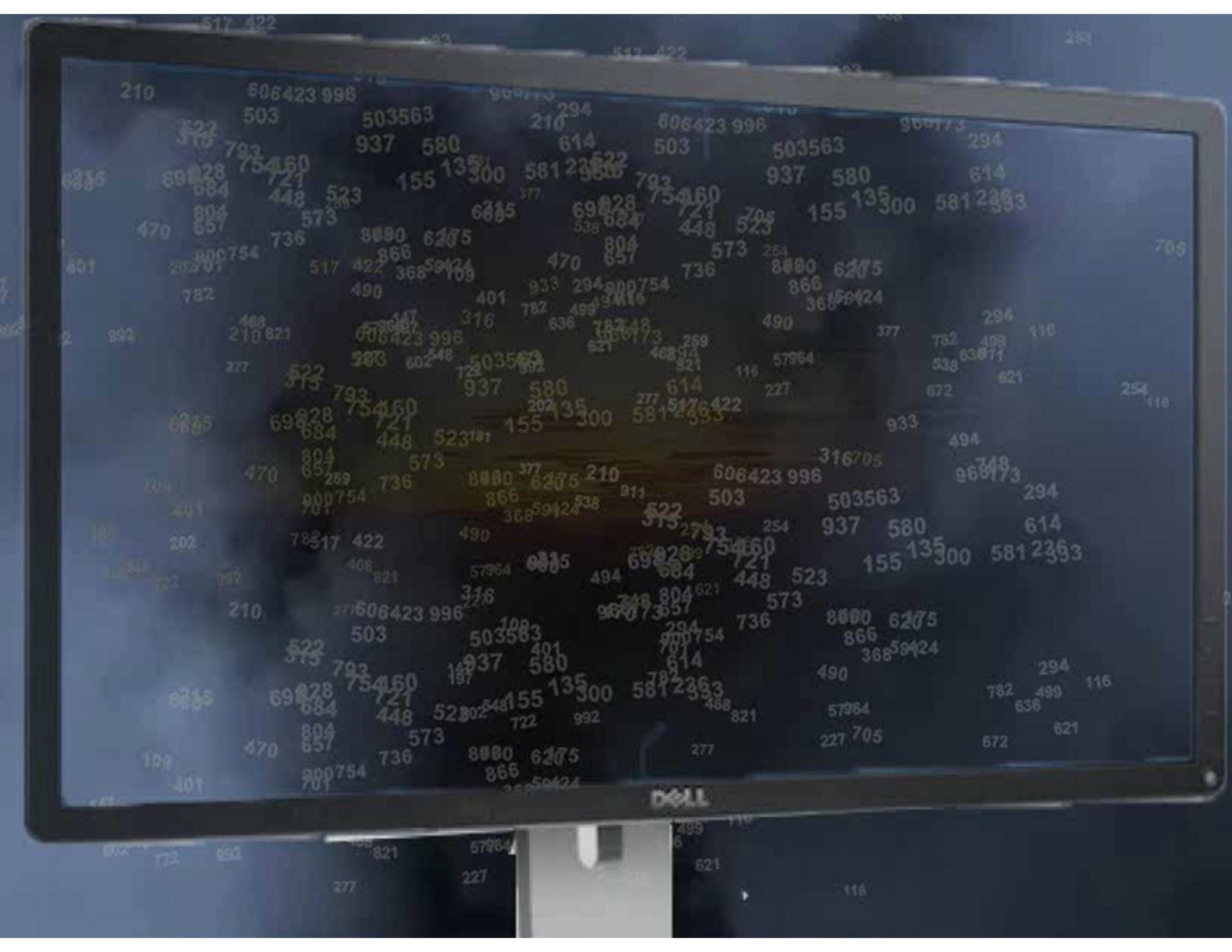
Pastiche Productions

Rank Amateur Films

Powered by 200 Mb of PowerPoint

& graphics from 


Darkness and
ignorance
reign ...


DELL

"Oh Say, Can you see …?"

An Edu-tainment

Chris Wild

University of Auckland

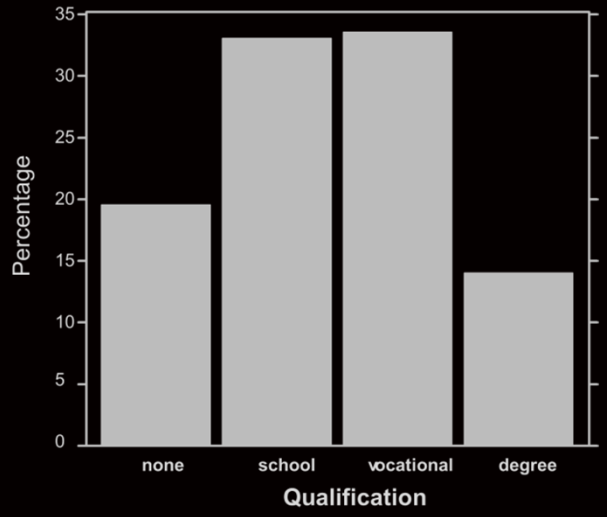
"Oh Say, Can you see …?"

Speaking into these elements: Early …

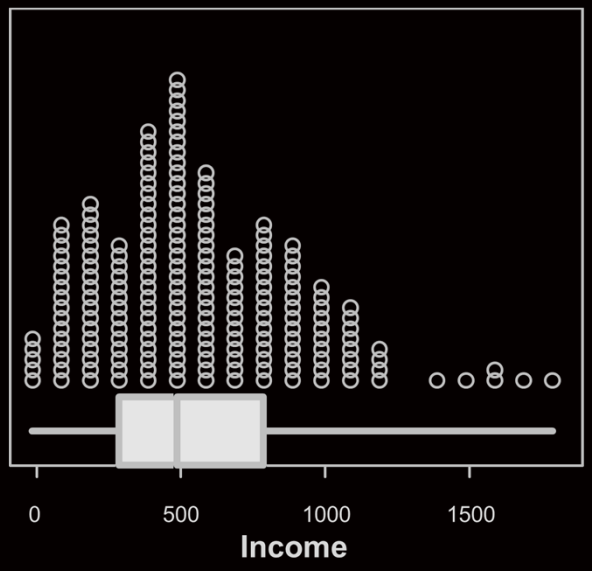
- **multivariate thinking**
- **visualisation …**
- **use of technology**
- **"Big" data**


How Gilding Familiar Lilies …
can illuminate our World

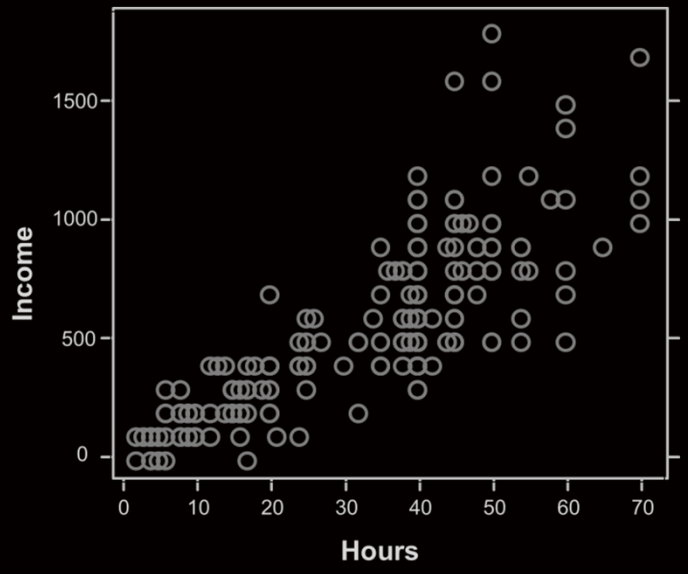
What are these familiar lilies ? …



Bar chart



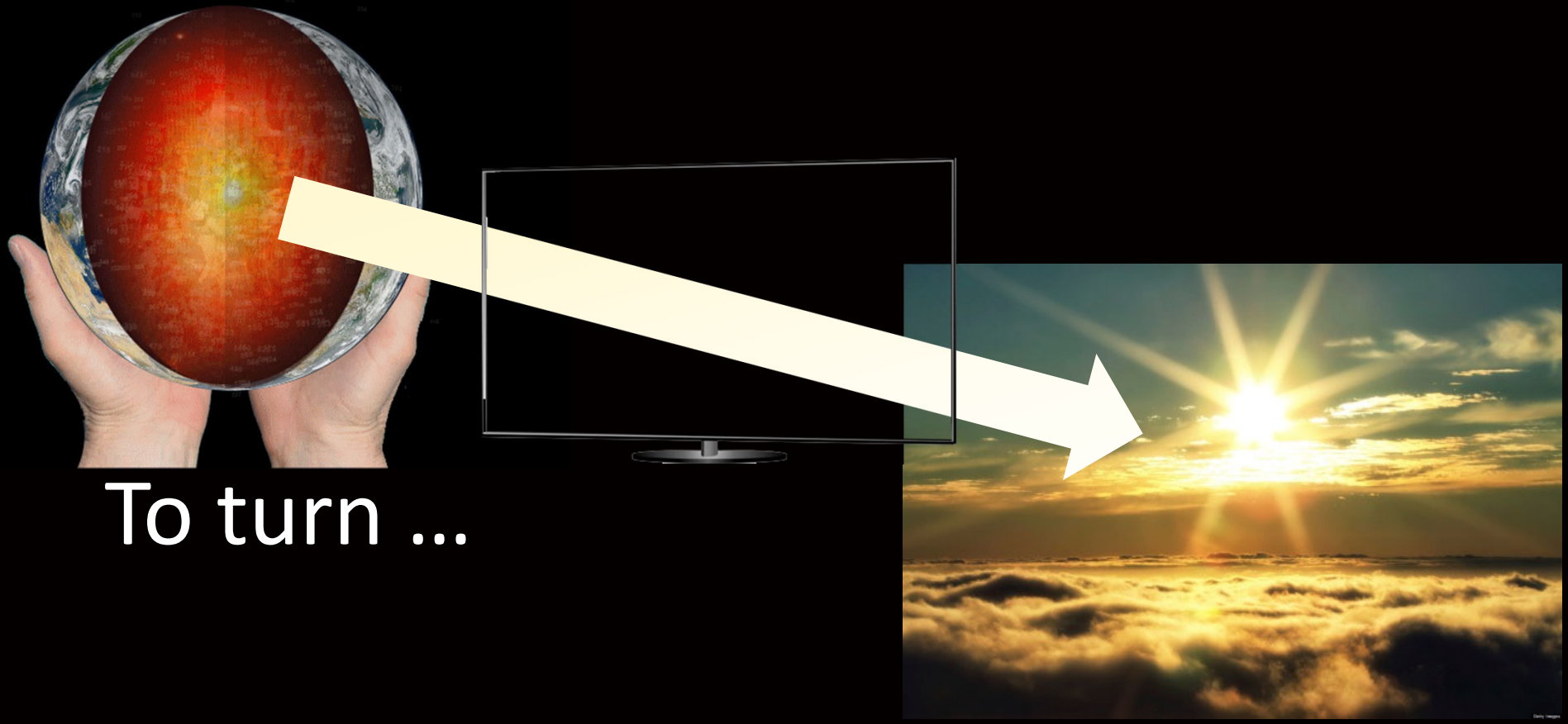
Dot plot



Scatter plot

What are these familiar lilies ? …

But how can we *gild them*
to gain deeper, *multivariate* insights?



To turn …

But here's an even better image …

Adding *Zing* to home-cooked meals

*with **herbs and spices***


Well Chris, These are some of my favourites …
So Rachael, What do we need for a well-stocked spice rack?


Stocking up the spice rack
• Colour my world
• Size matters
• Subsetting / Faceting
• Stepping through lists lking
• Motion ep on moving
• Identification & brushing
• Transparency
• Bait & Switch

Cooking with spices … This talk …

Less …

More …

Why ???

Holi: Indian festival of Colour

What is *the single best thing*

we can do for our students?


Populate
their imaginations
with possibilities

Along the way, we'll find …

You can't always get what you want

Along the way, we will find …

"Careful with that axe …"

And we have to be a bit careful …

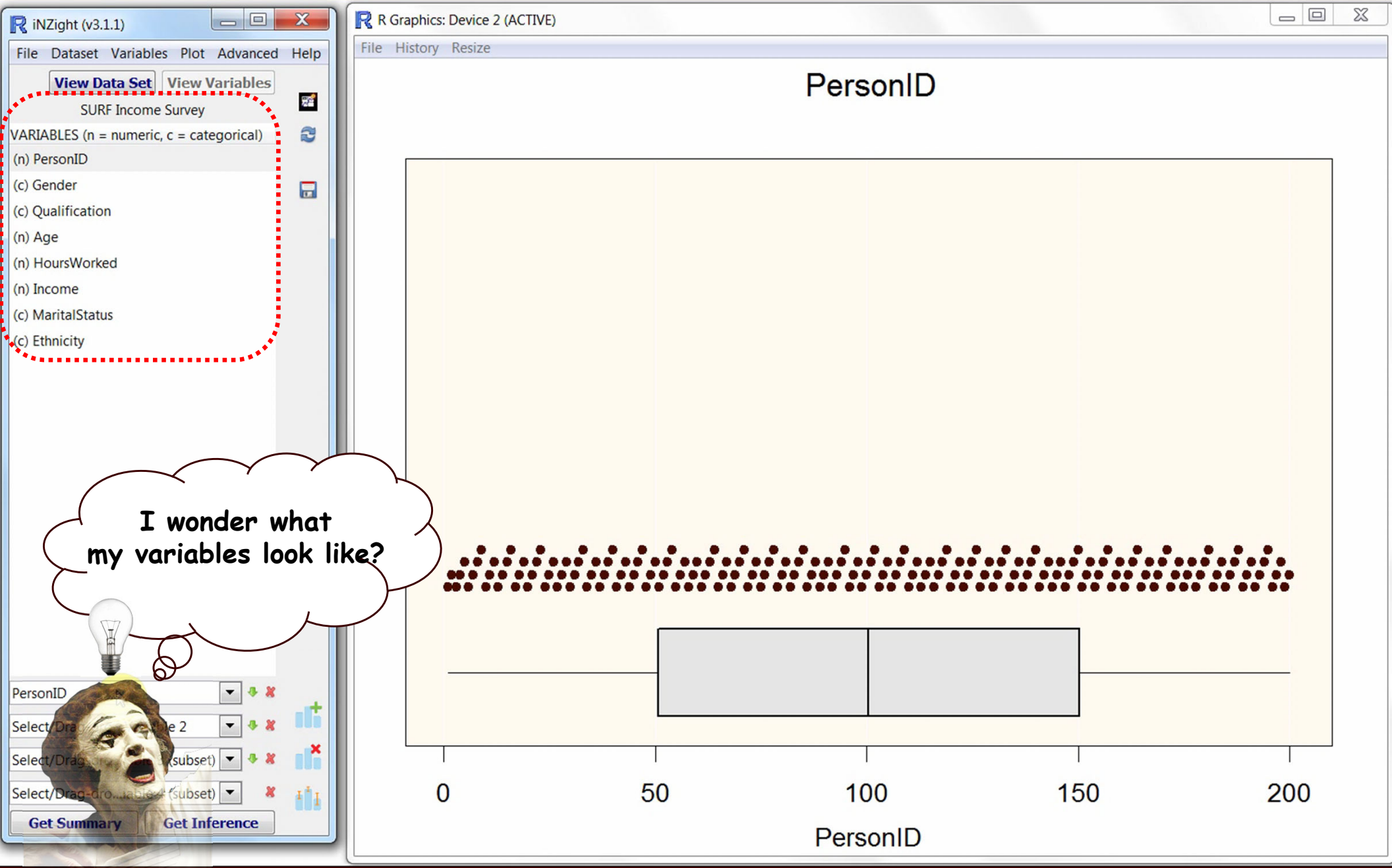
But ours is a statistics …

driven by passion!

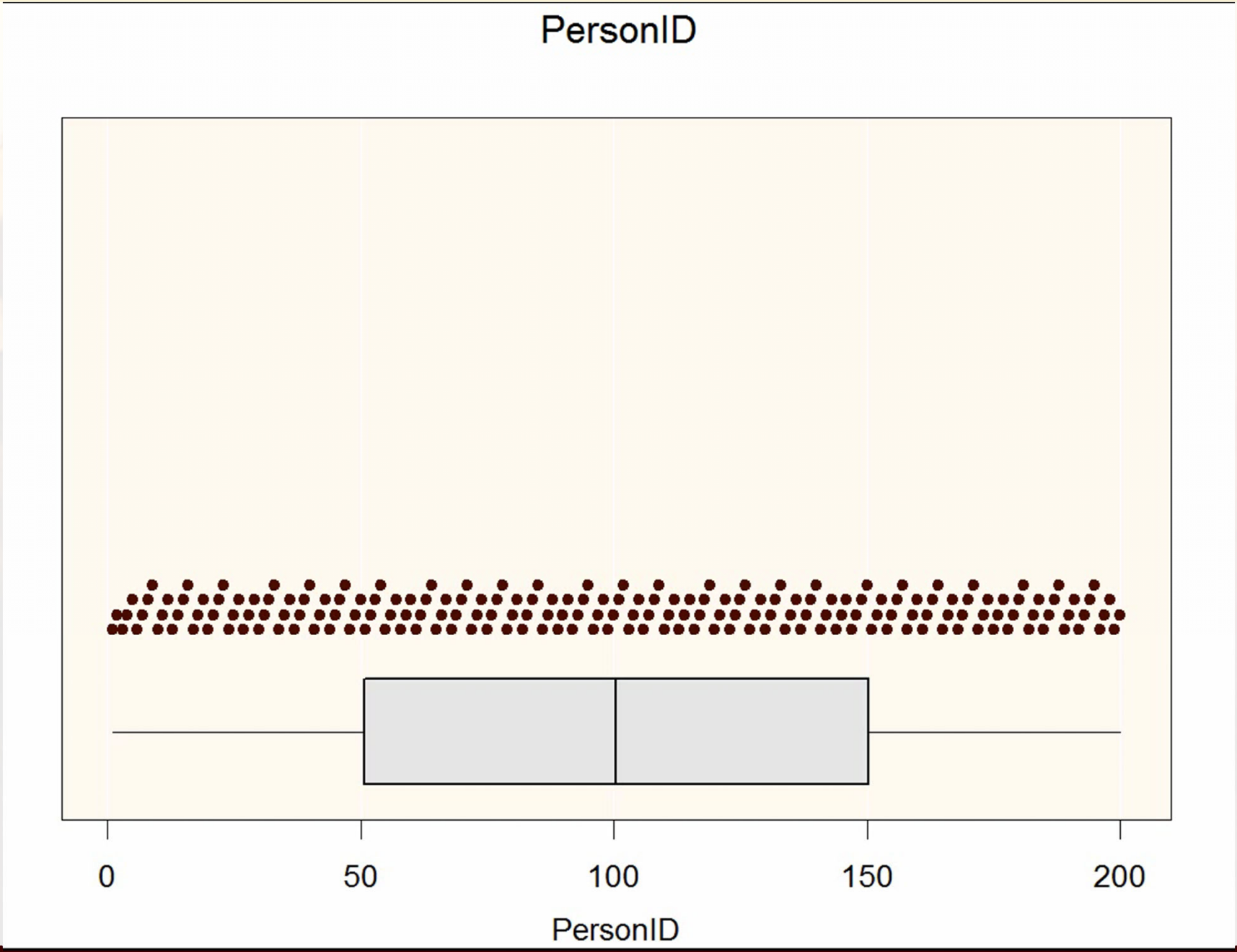
So let's get cooking !!

… **Stepping** through Variables

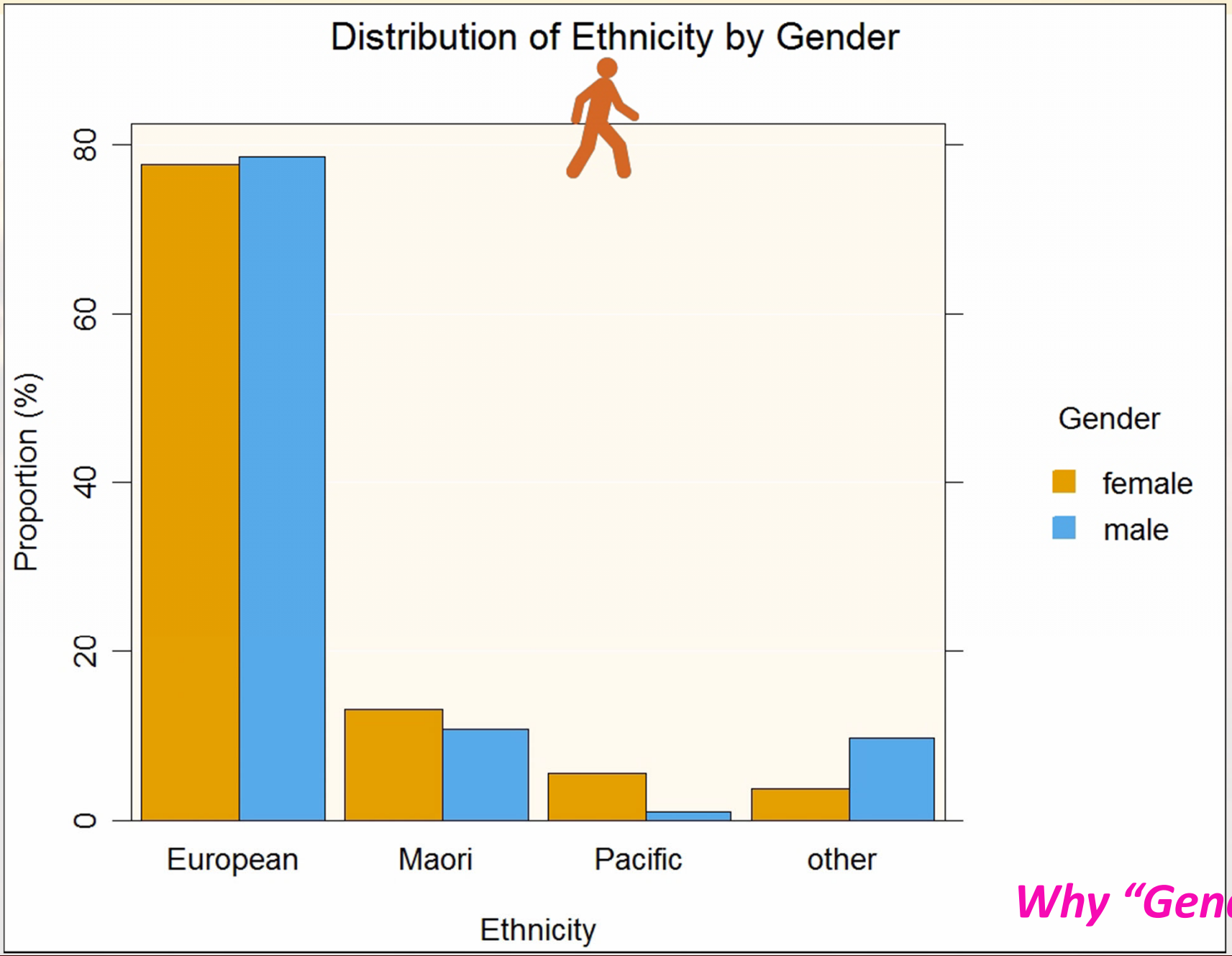
Stepping through Variables



Stepping through Variables



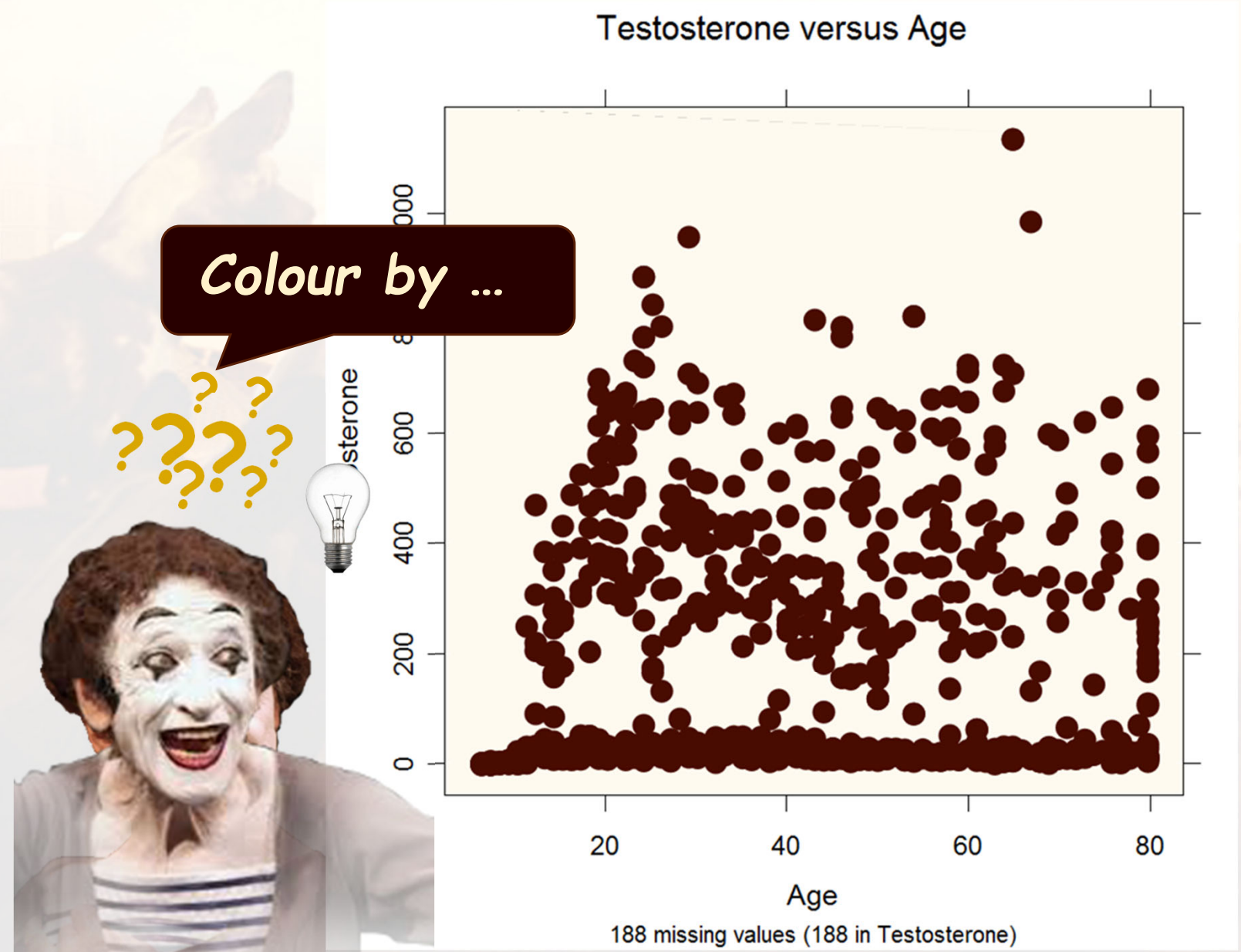
Relationships to Gender



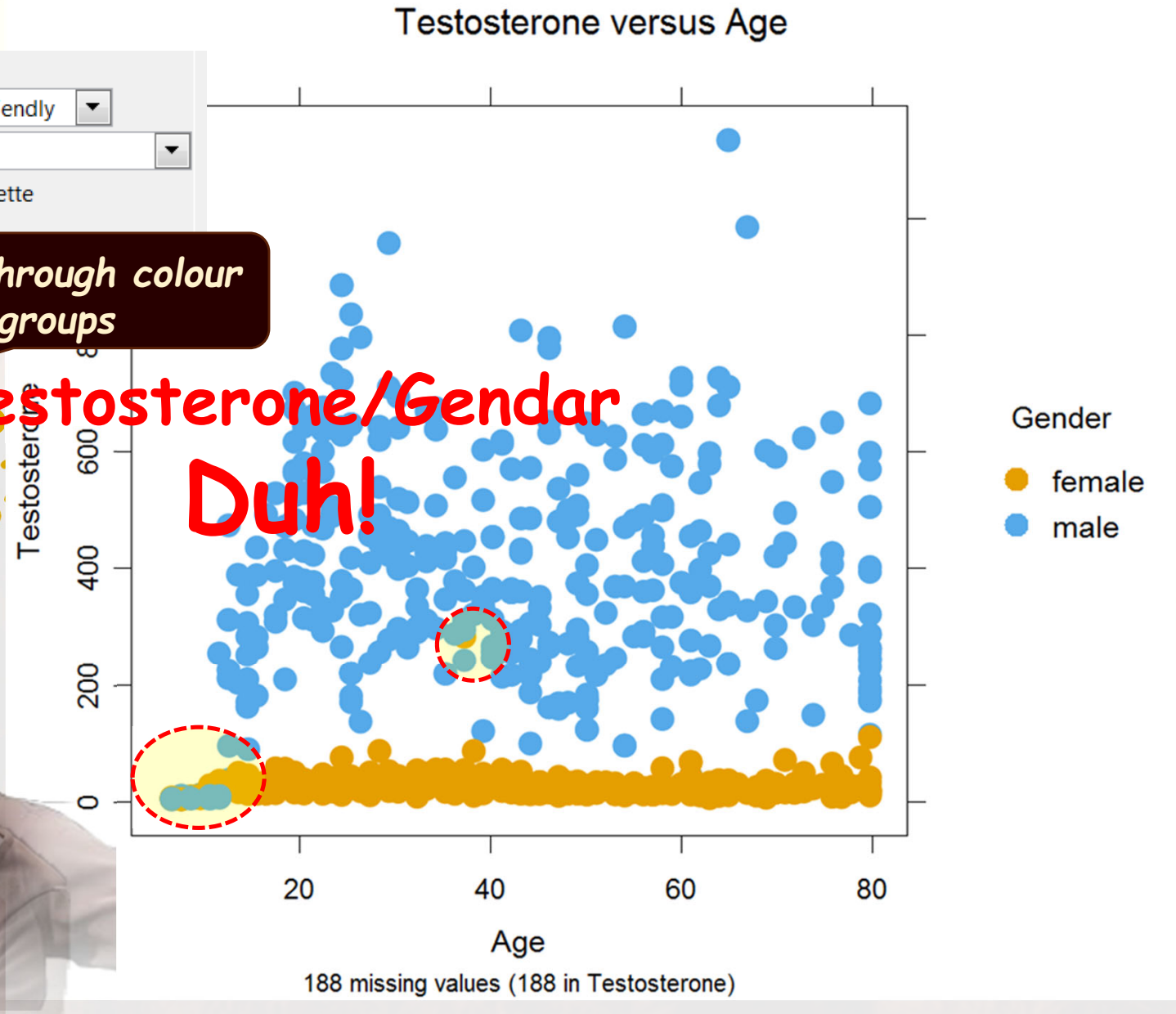
Why "Gender"?

Tasting Colour …

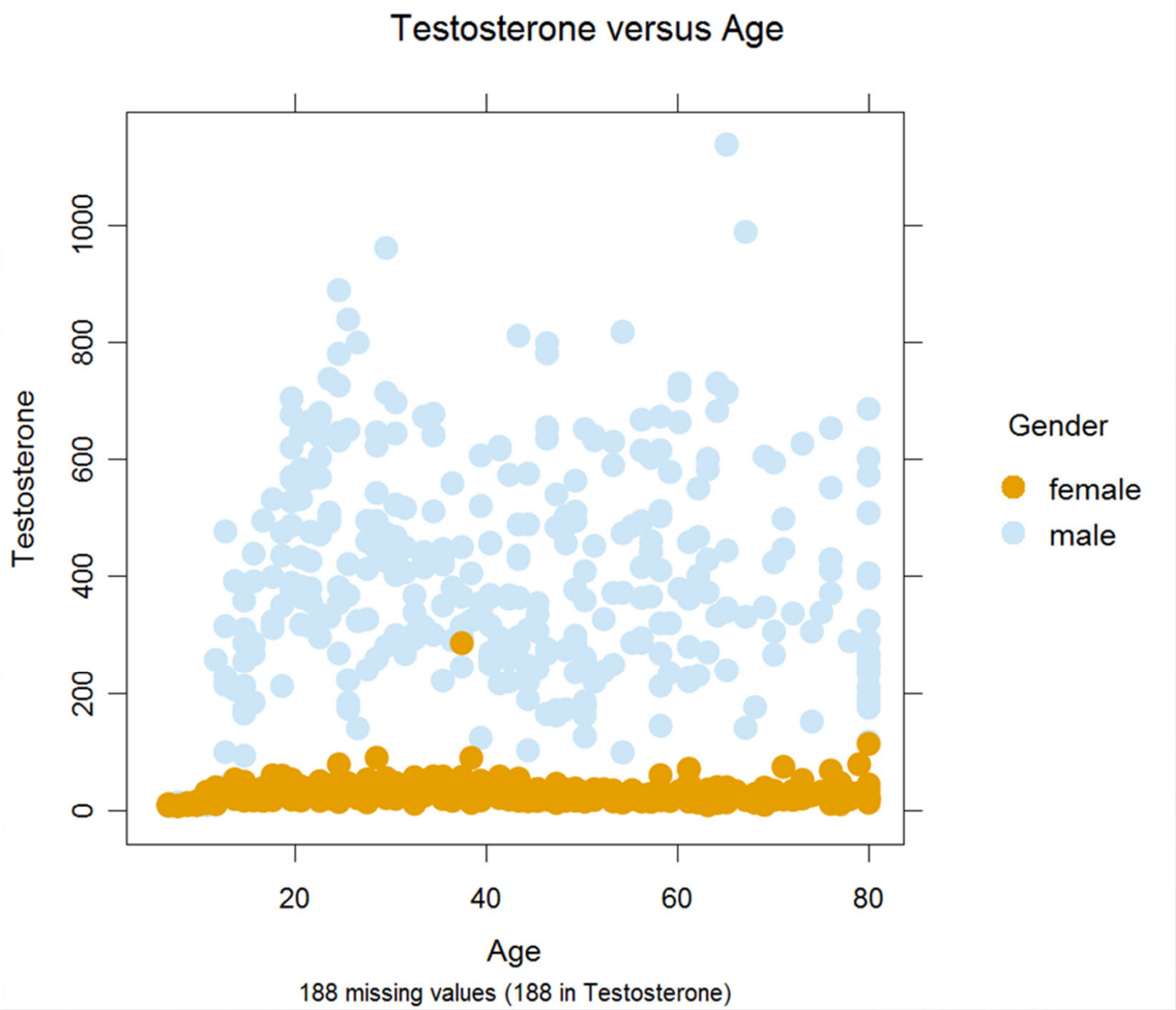
Testosterone levels by Age



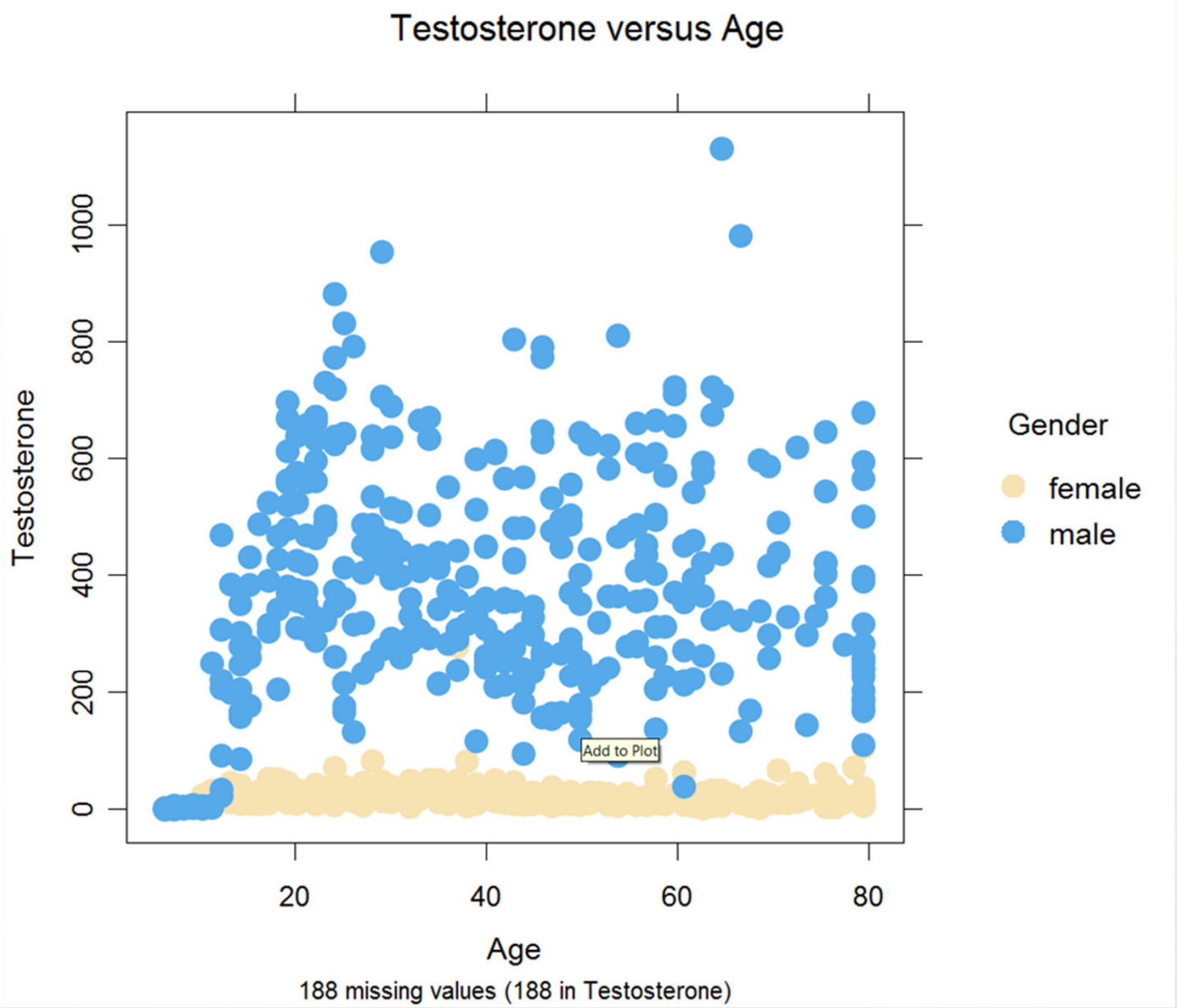
Colour by Gender



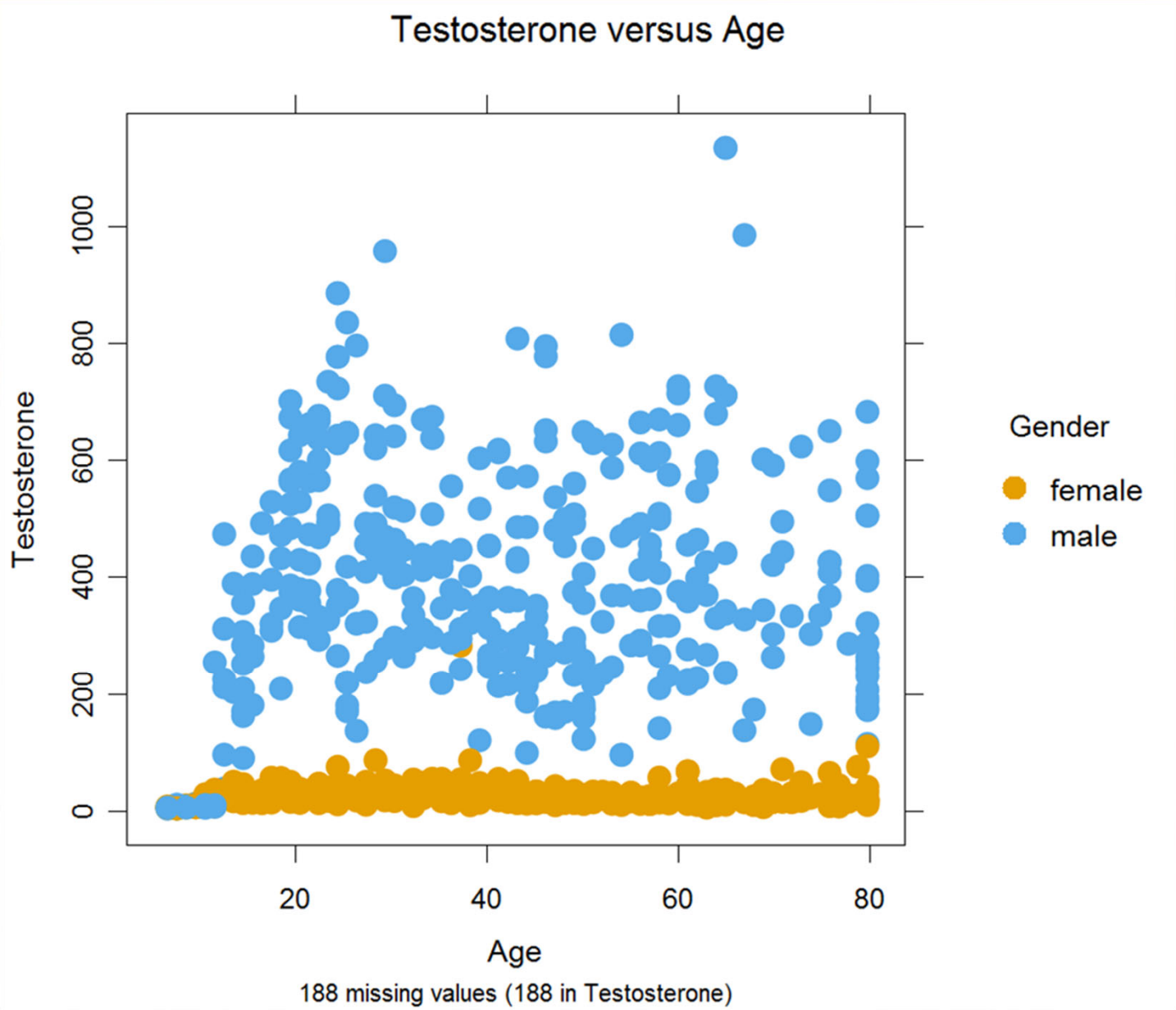
Highlighting the **females**



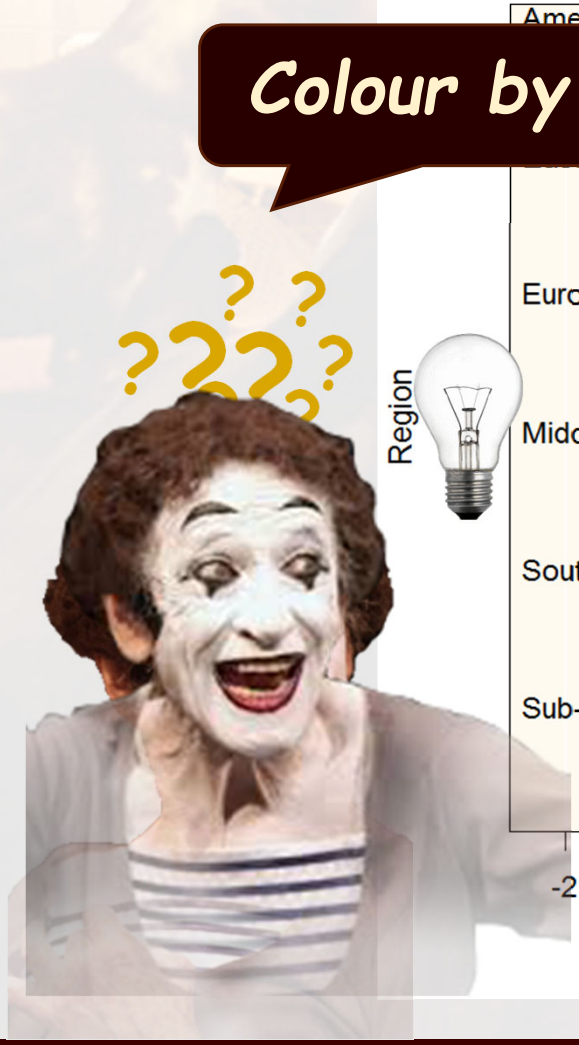
Highlighting the **males**

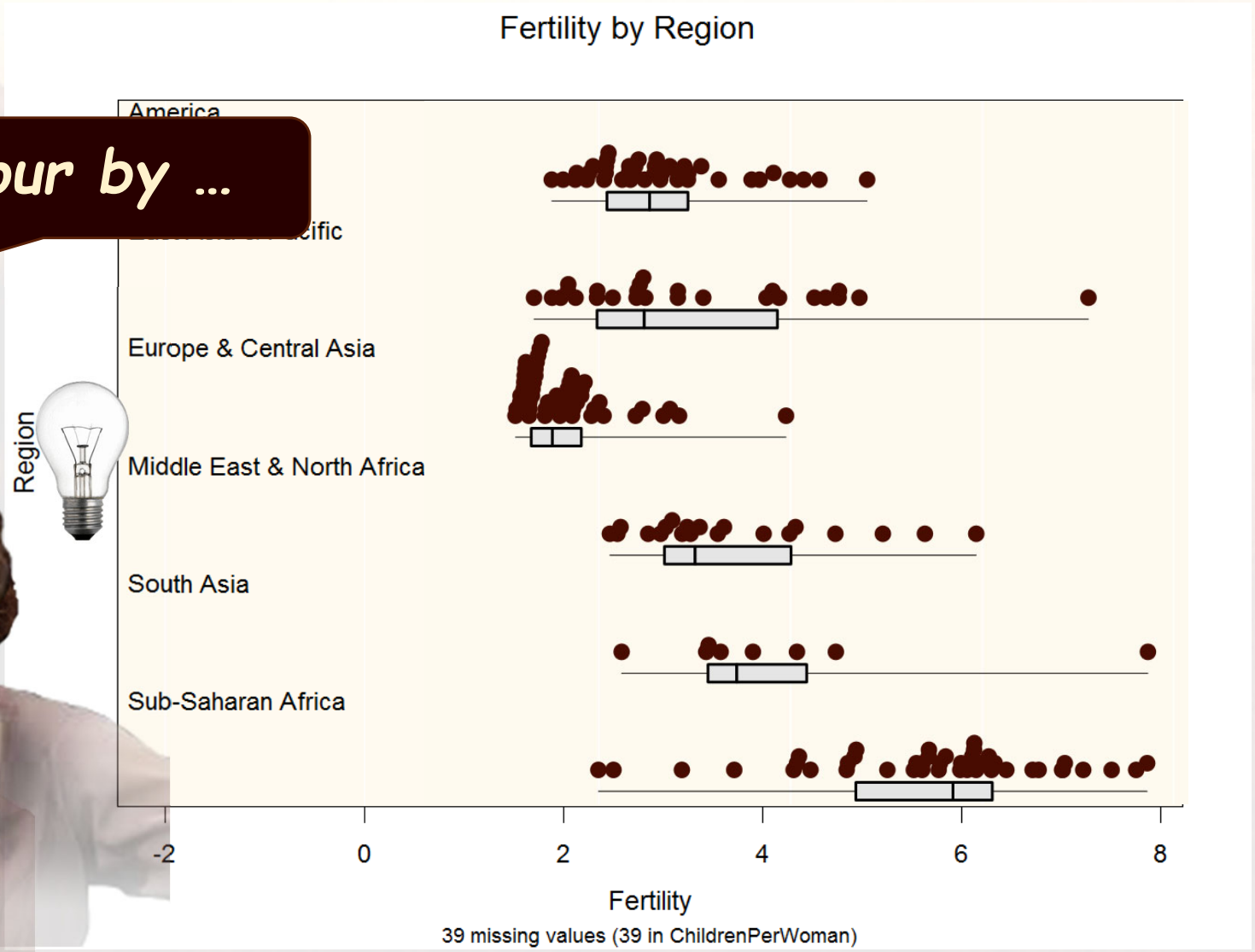


Colour by Gender

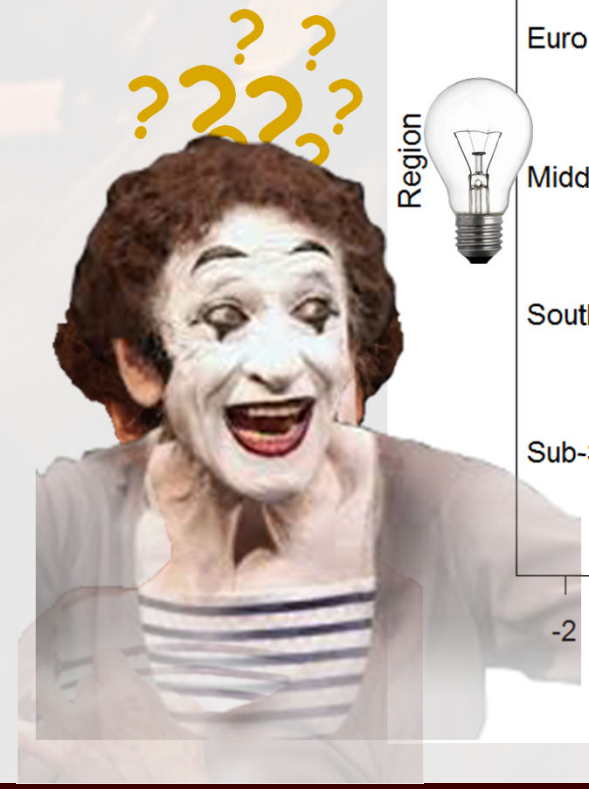


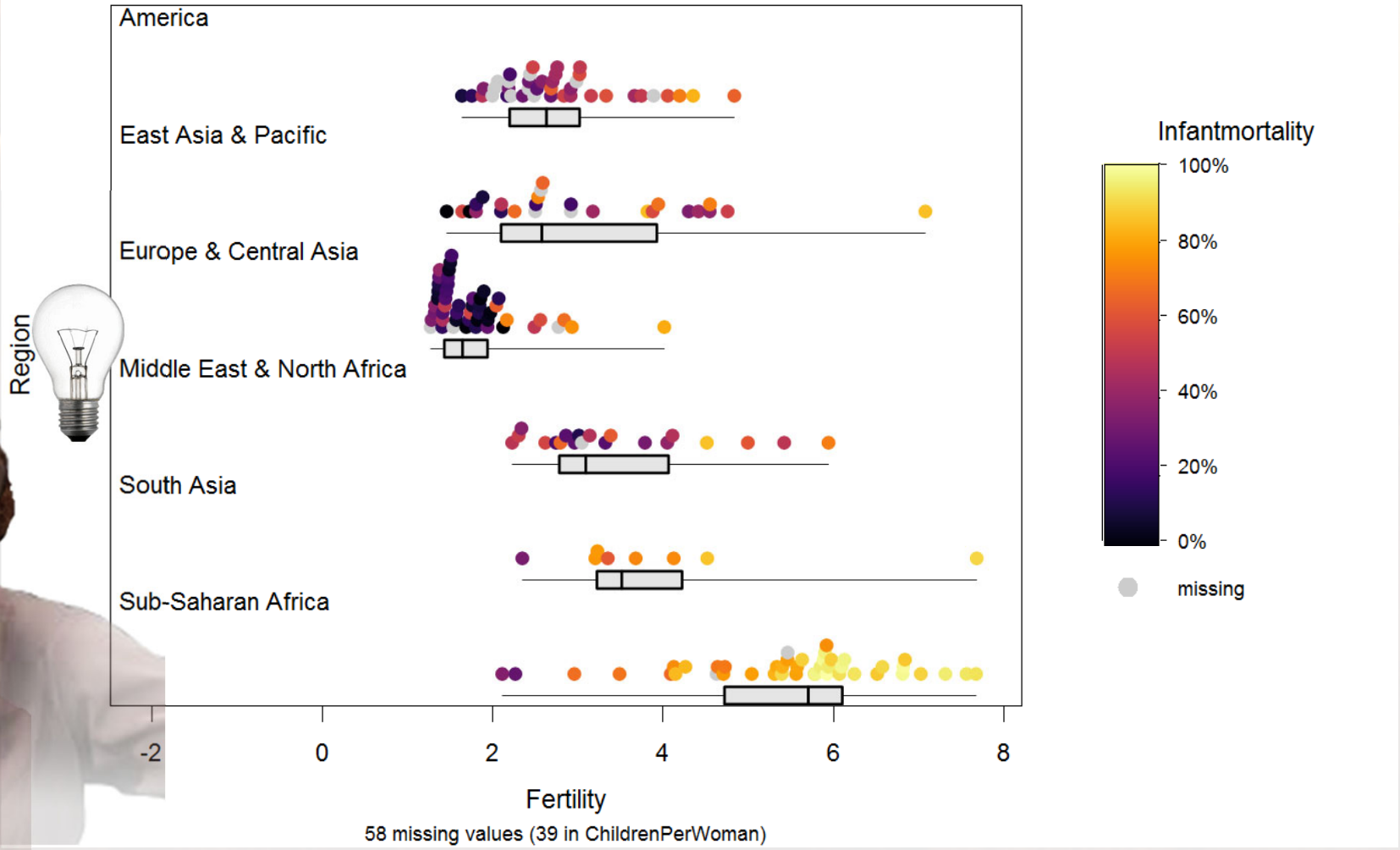
Fertility by Region



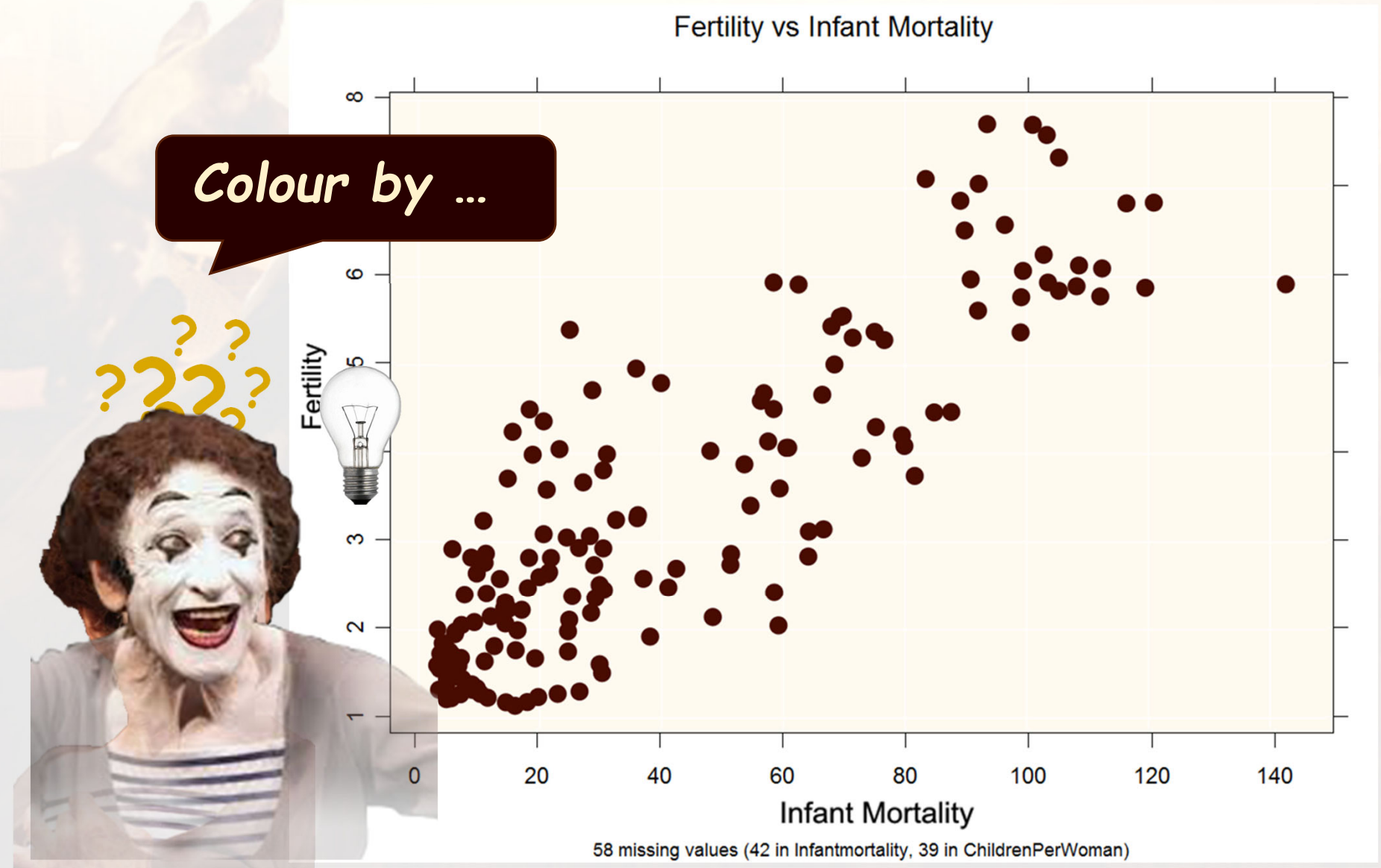


Colour by **Infant Mortality**

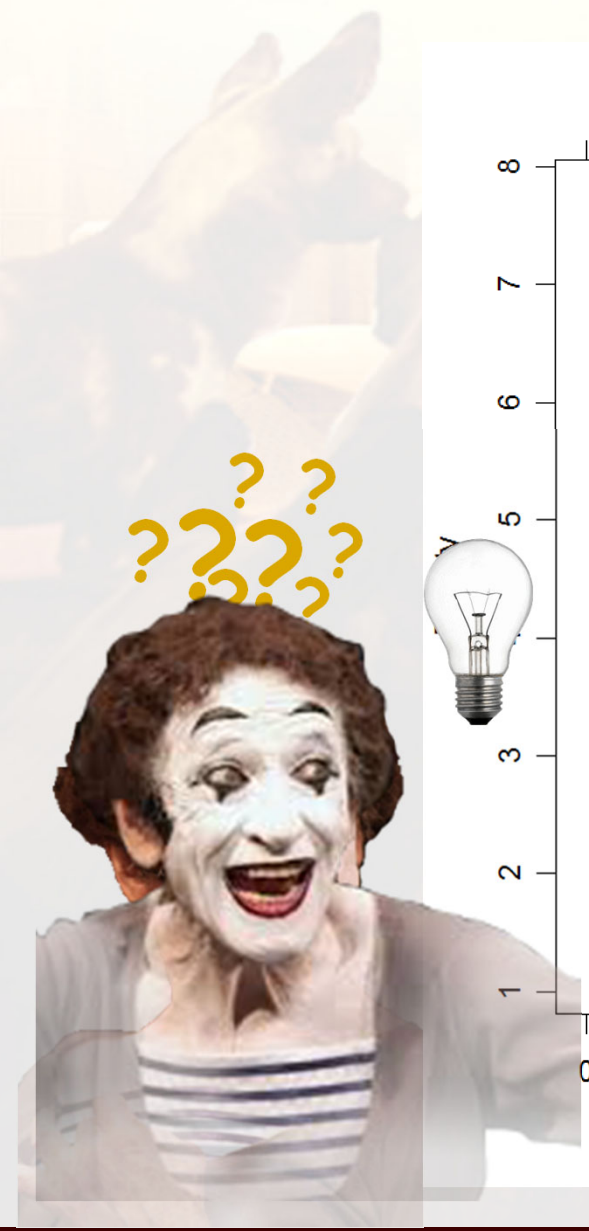


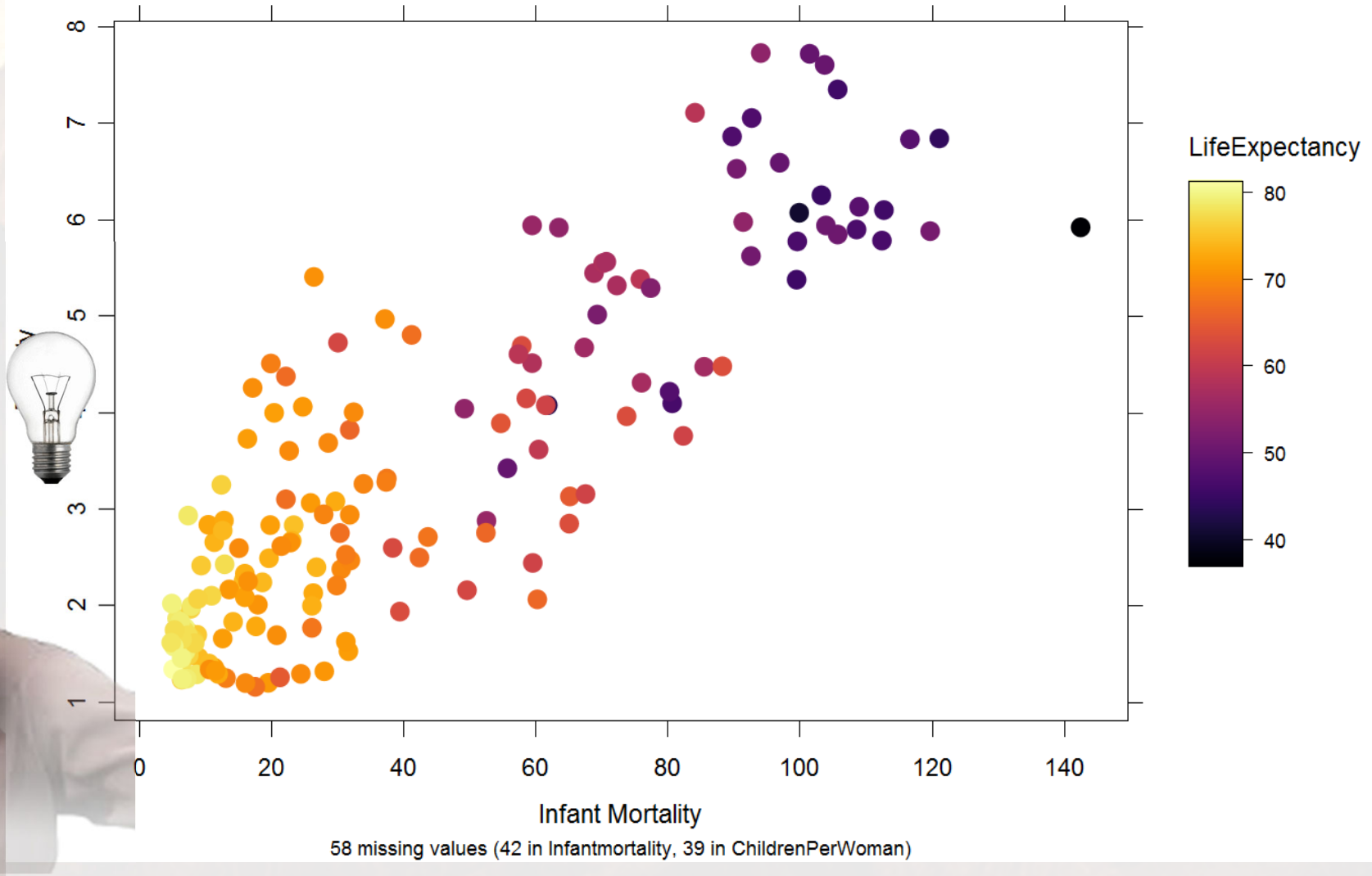


Fertility vs Infant Mortality

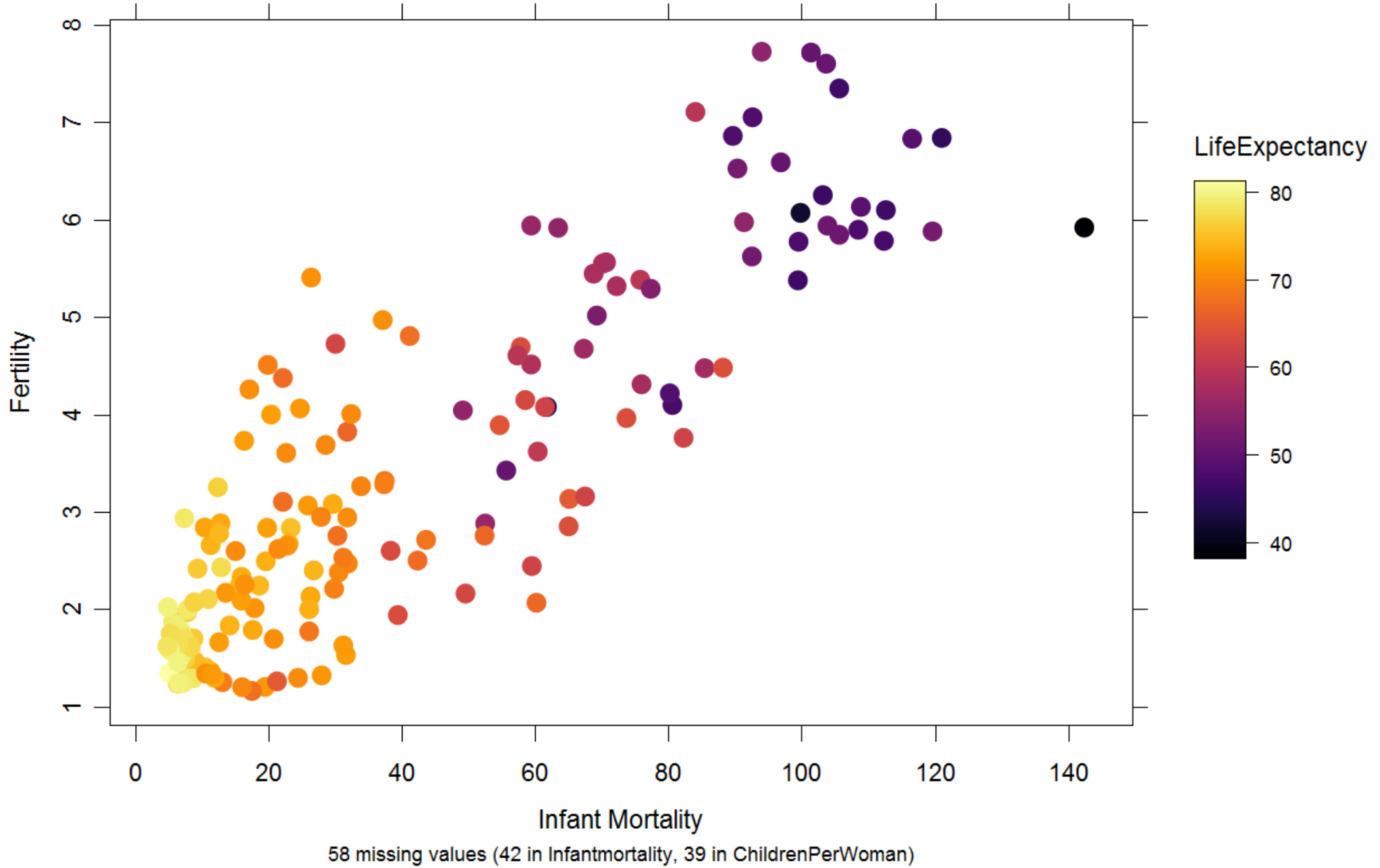


Colour by **Life Expectancy**

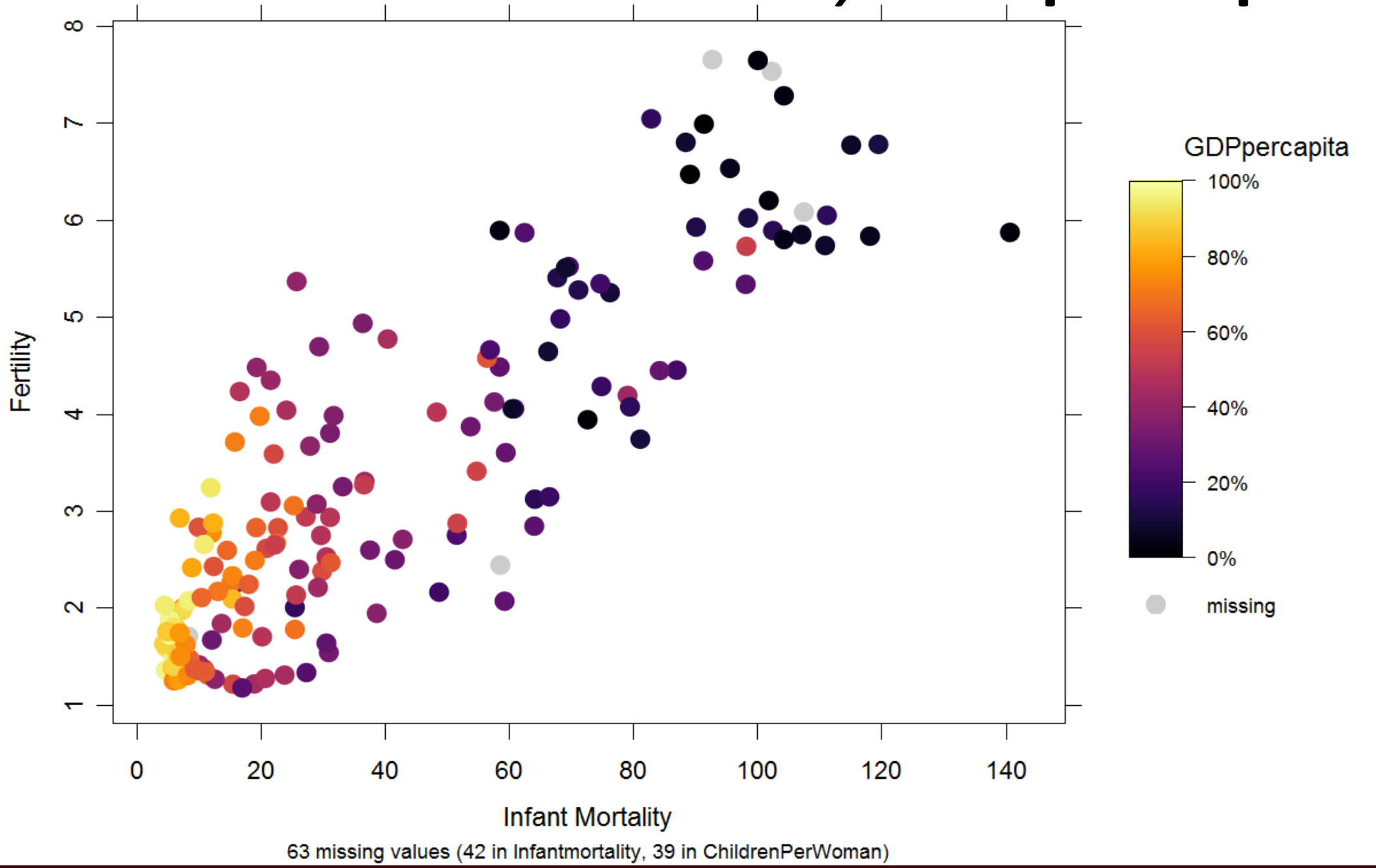




Colour by **Life Expectancy**

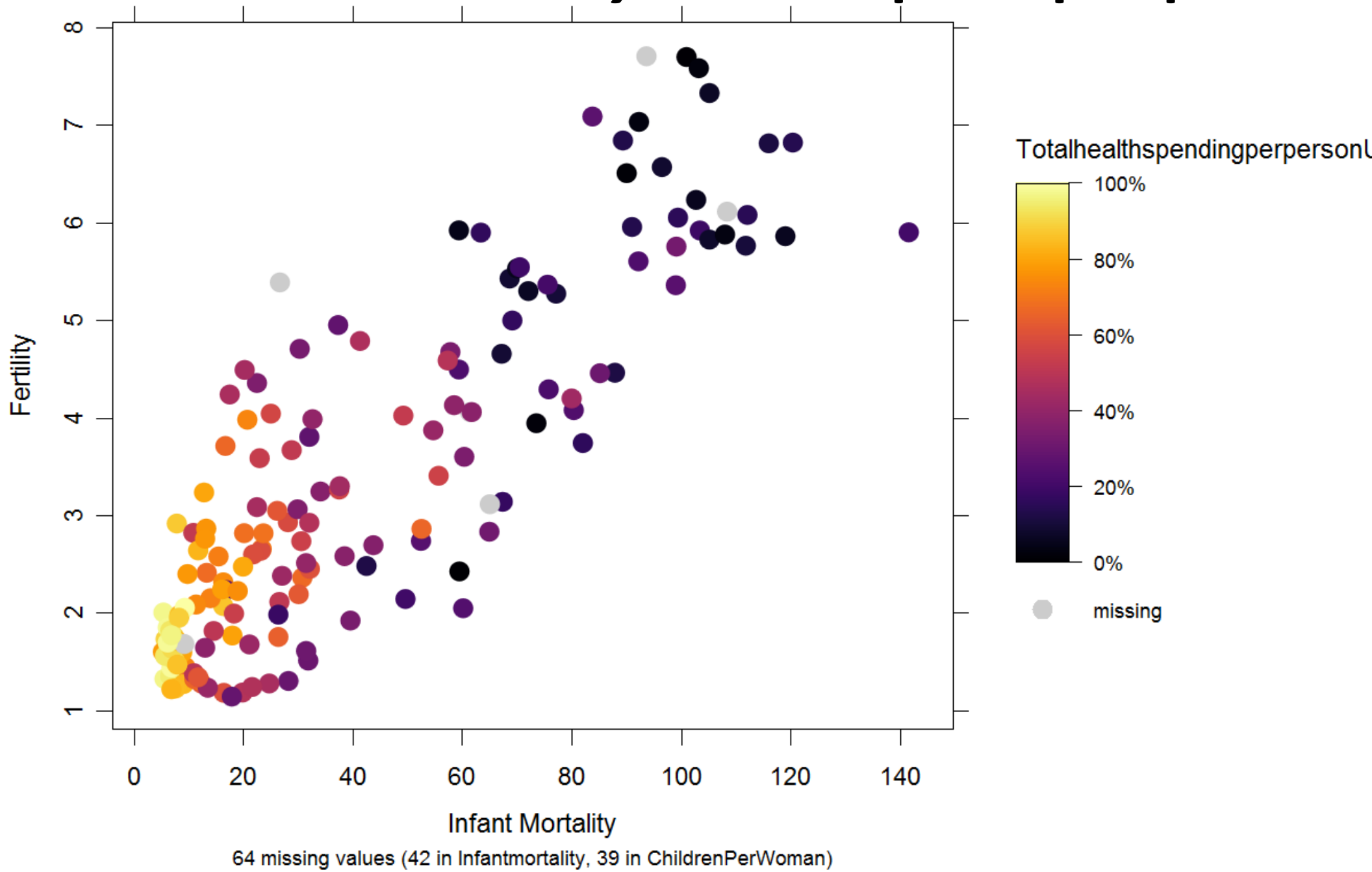


Colour by **GDP per capita**



63 missing values (42 in Infantmortality, 39 in ChildrenPerWoman)

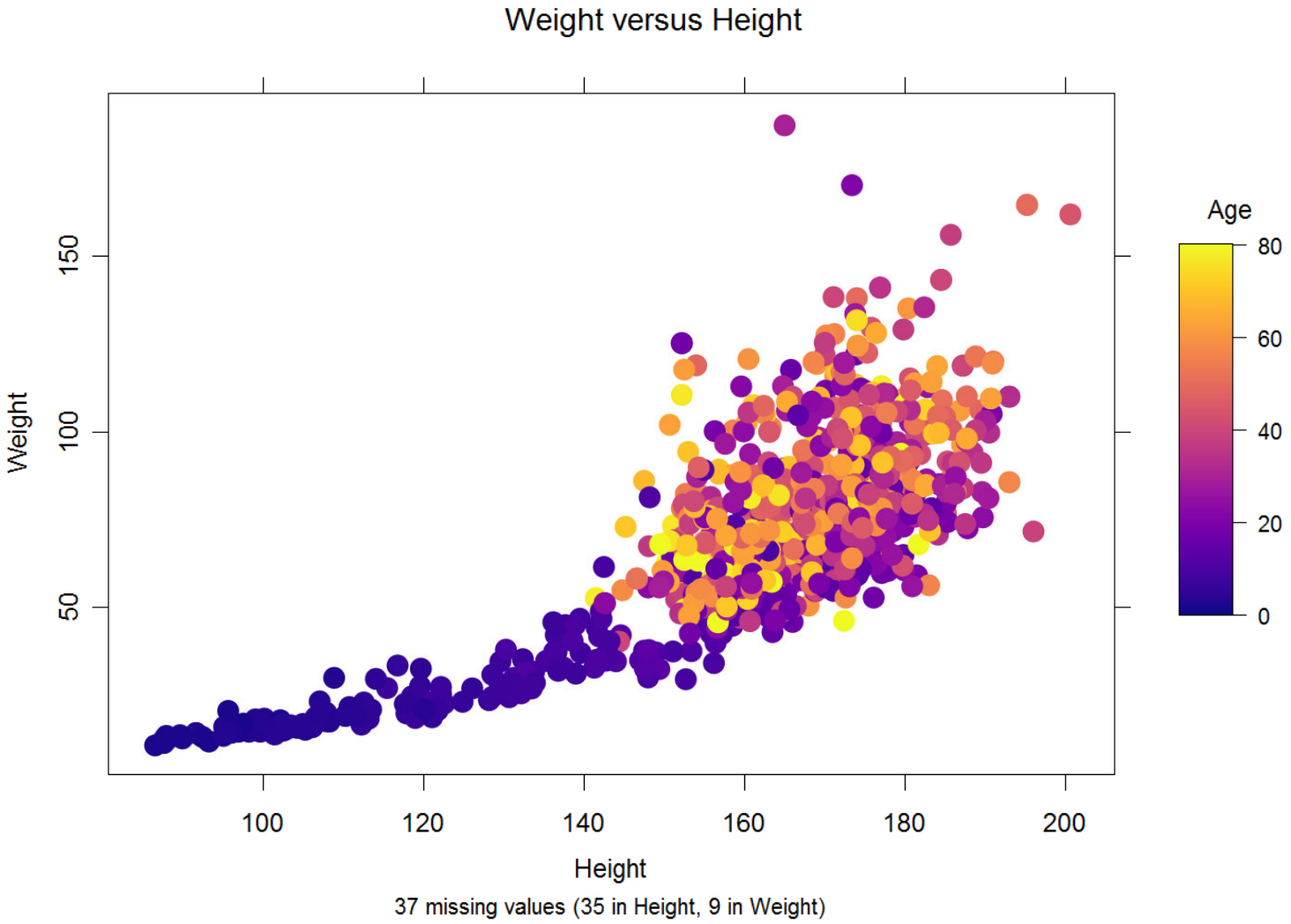
Colour by Health spend per person



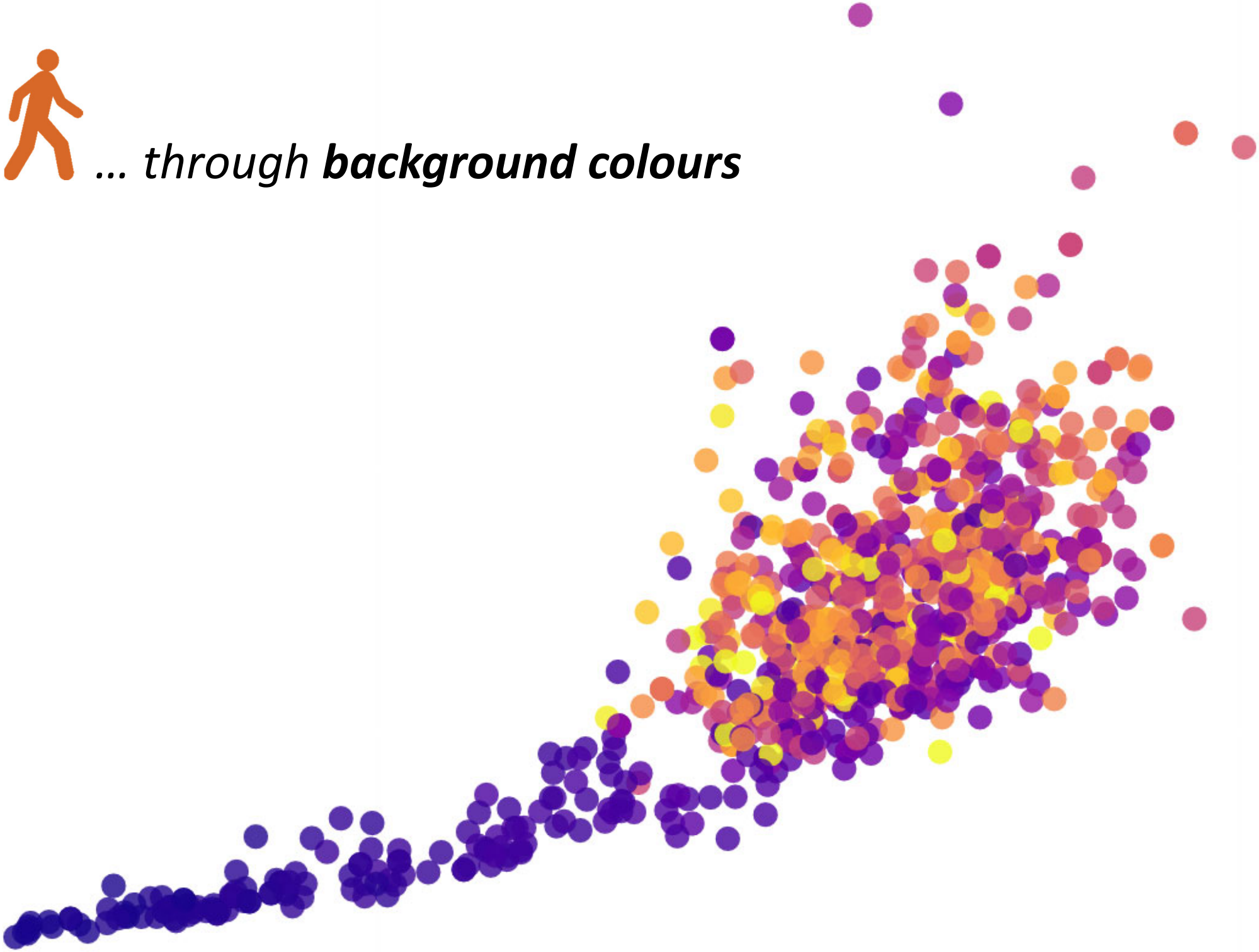
64 missing values (42 in Infantmortality, 39 in ChildrenPerWoman)

… **Stepping** in Colour space

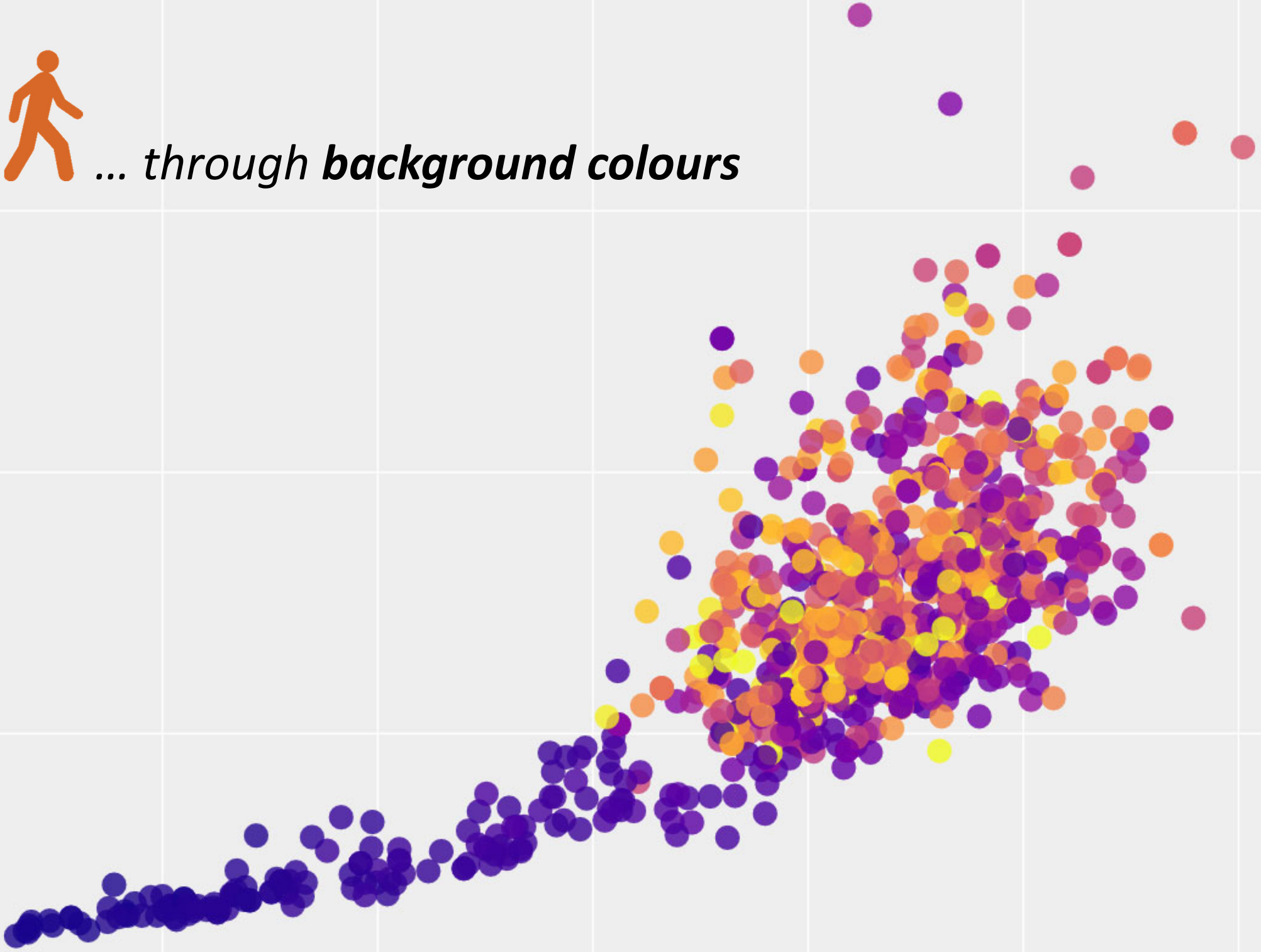
*… through **background colours***

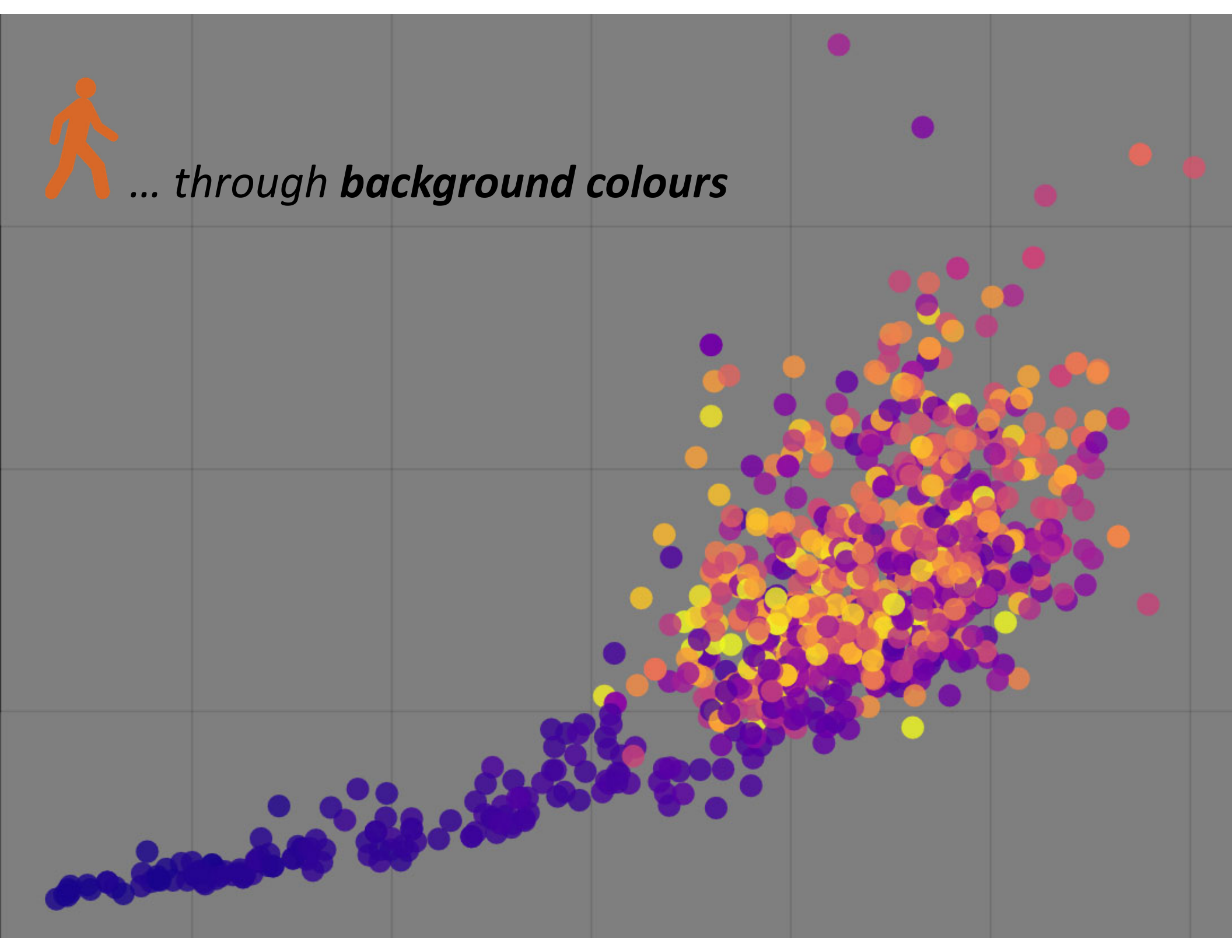


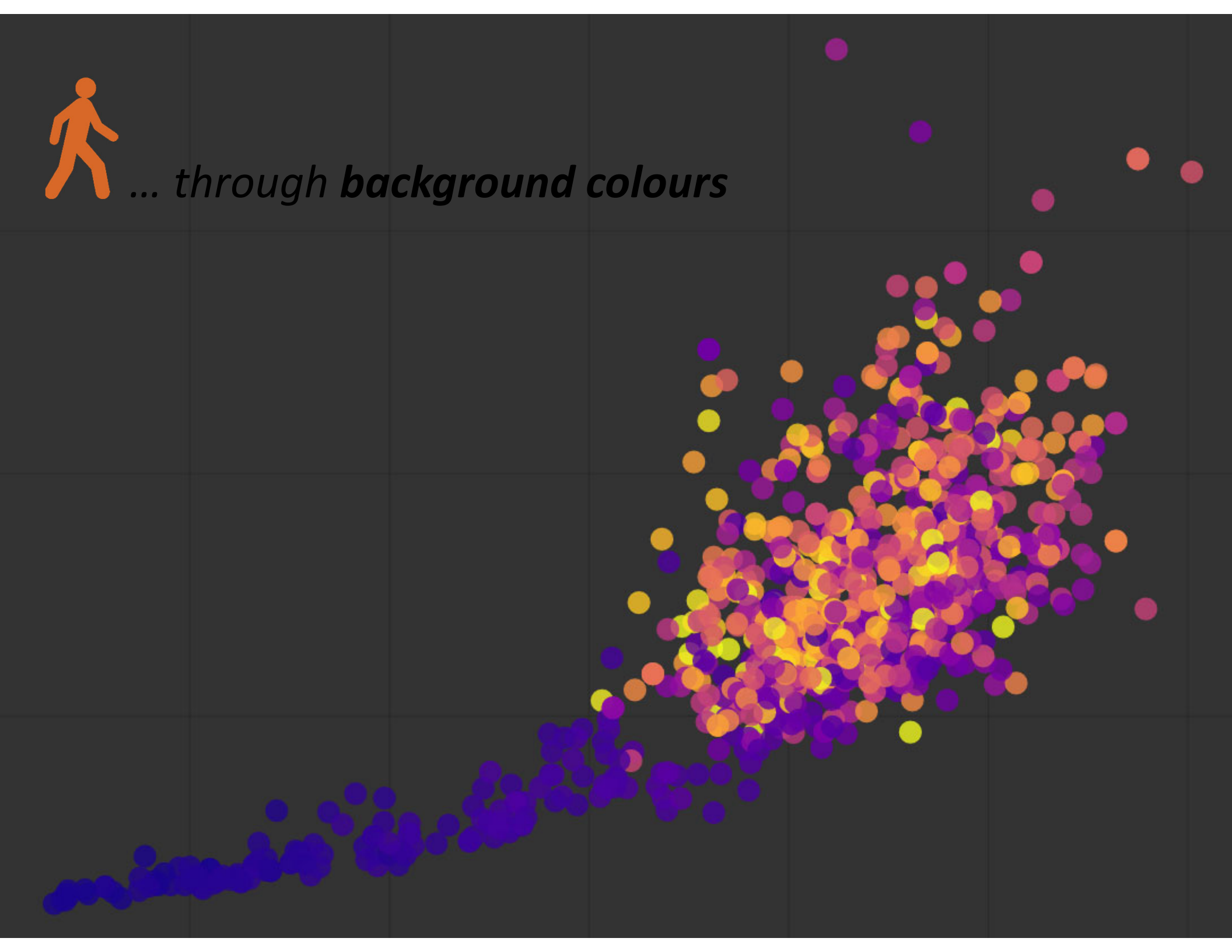
… through ***background colours***

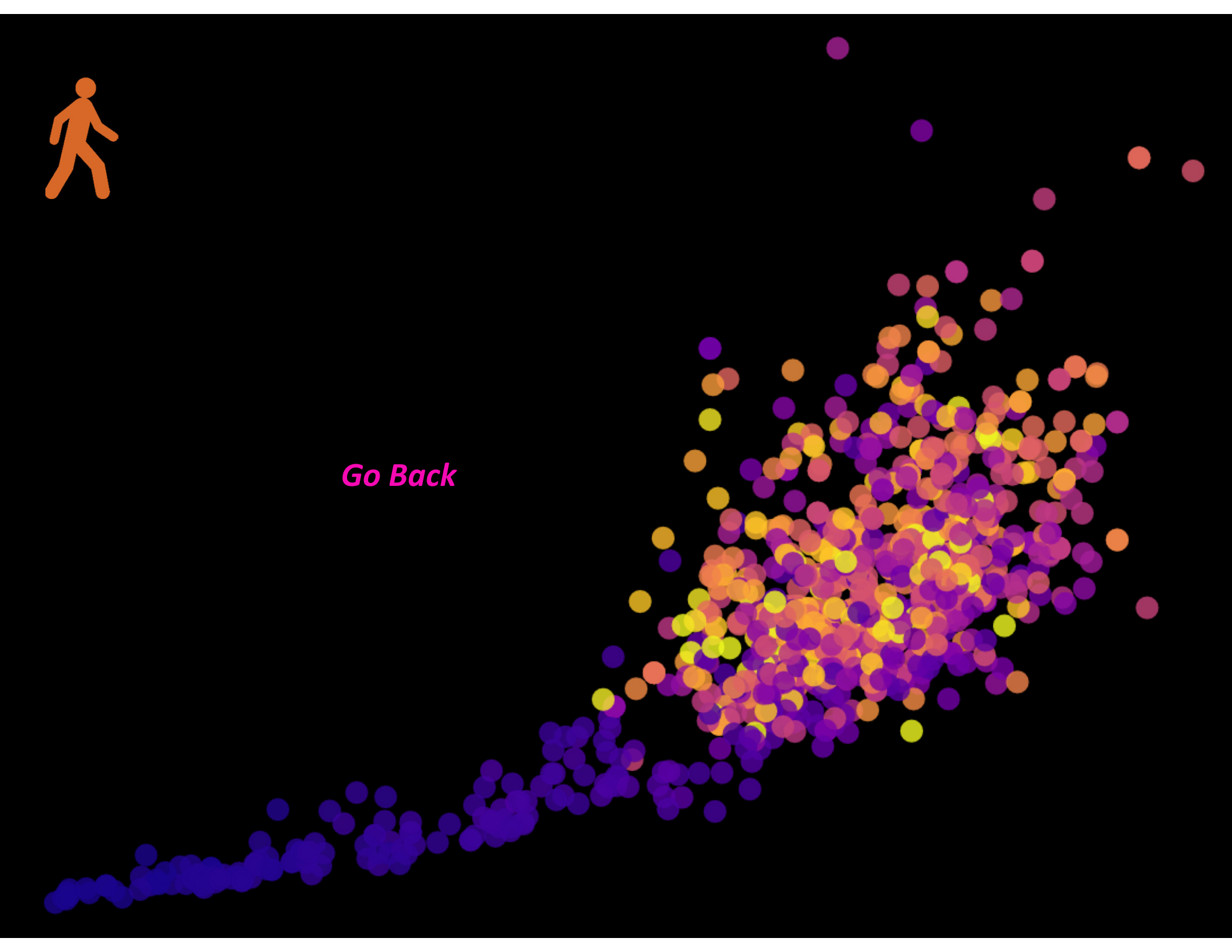


*… through **background colours***



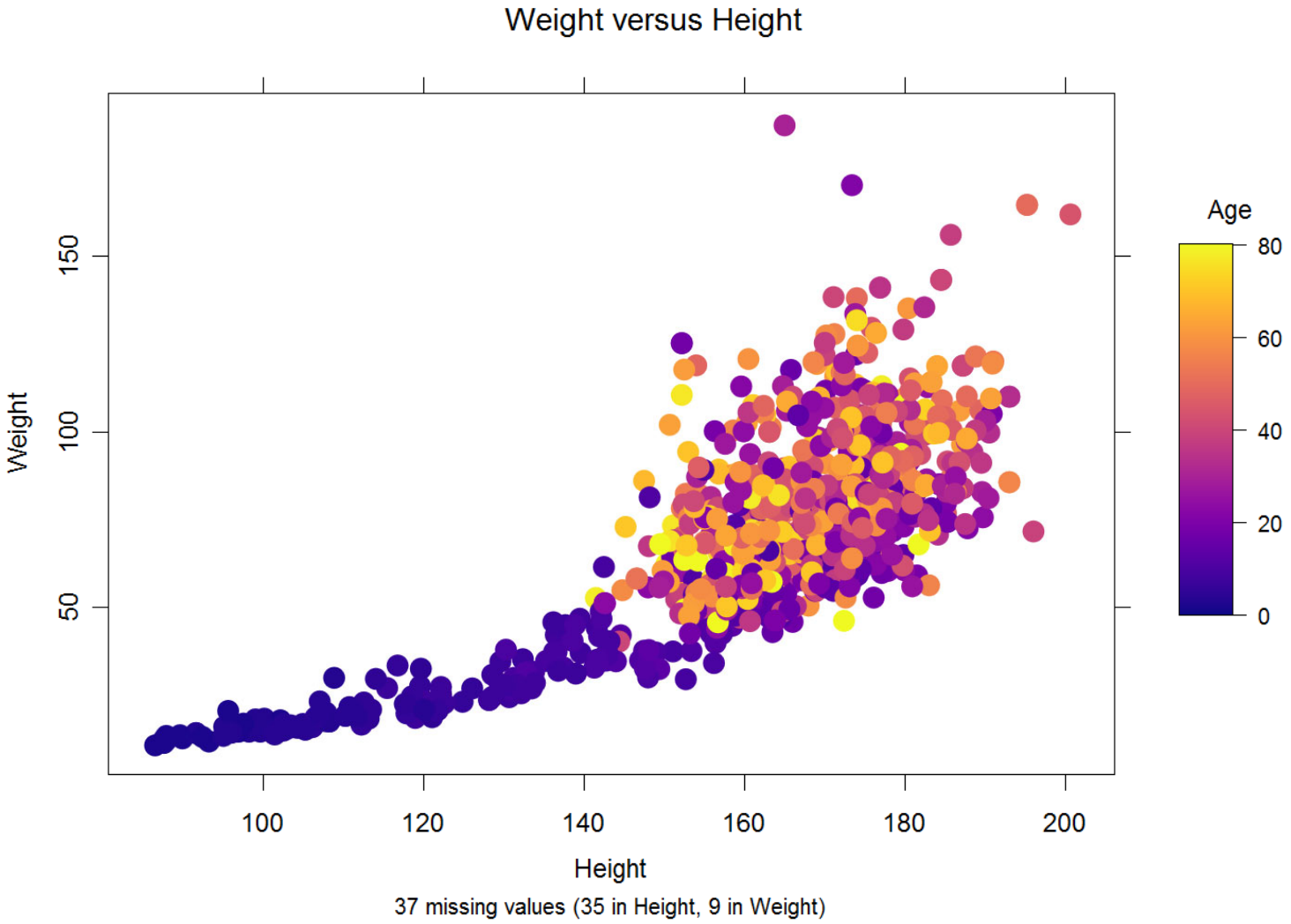

... through **background colours**


... through **background colours**

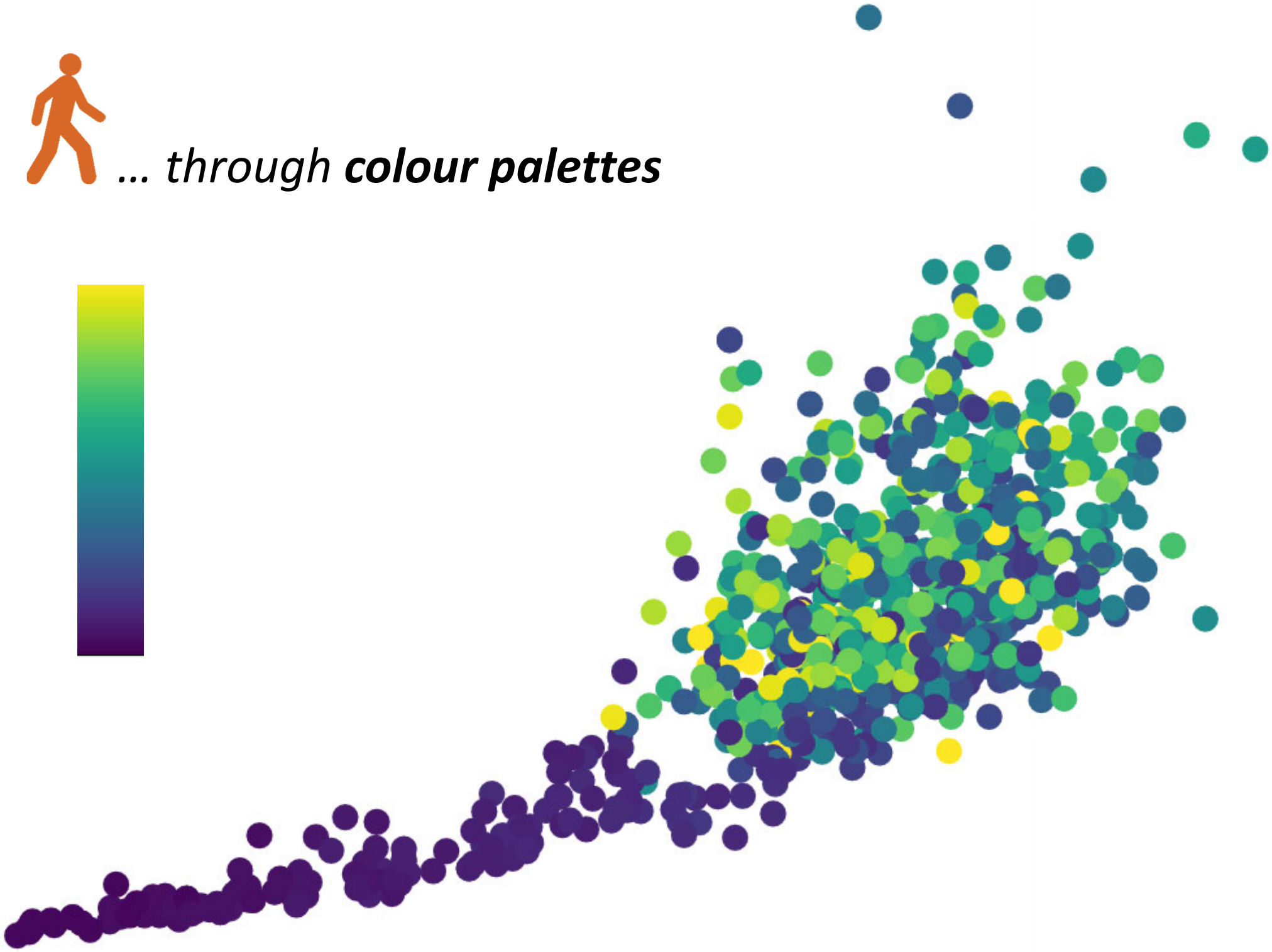

Go Back


Background
matters

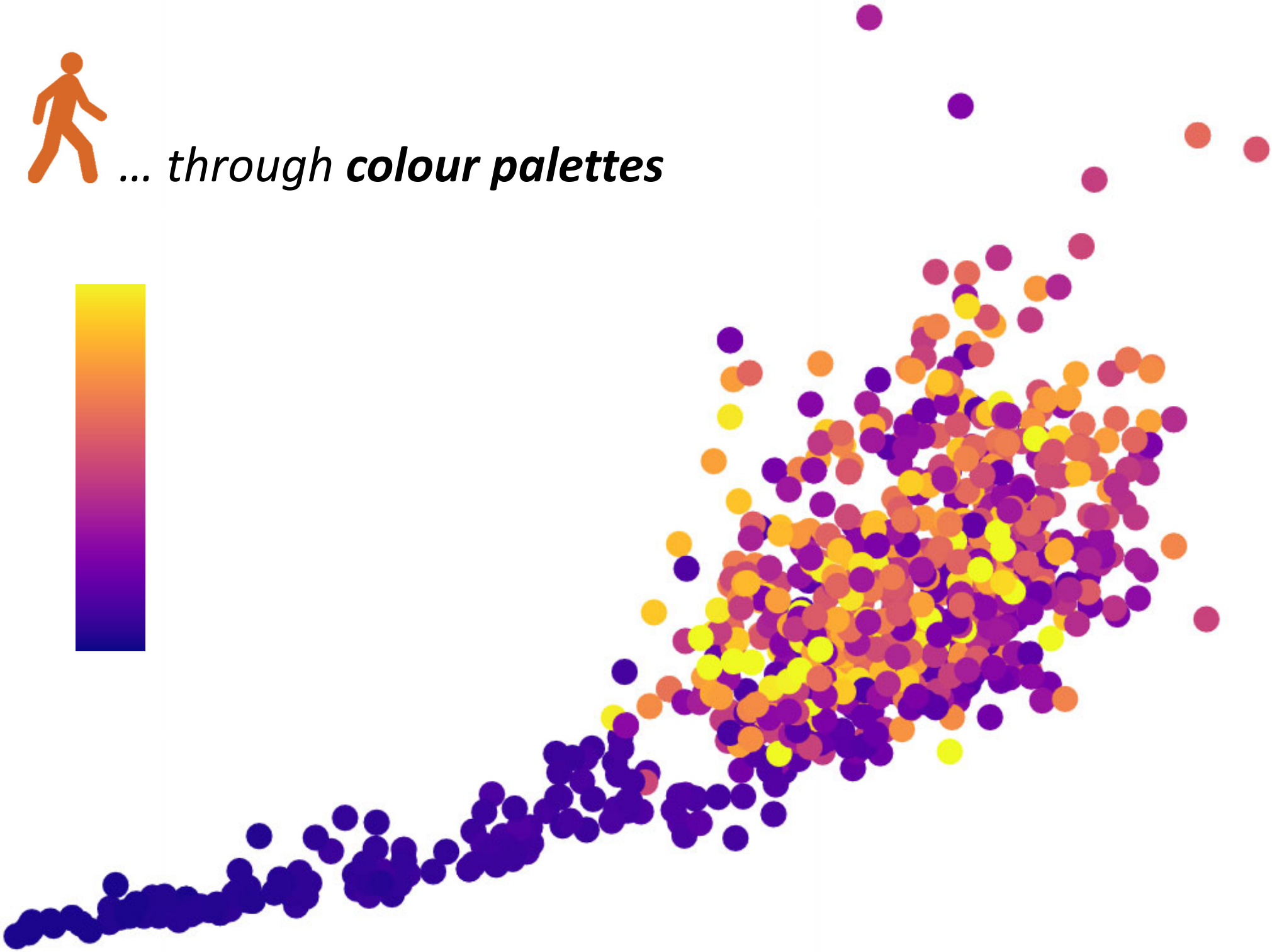
… *through* ***colour palettes***



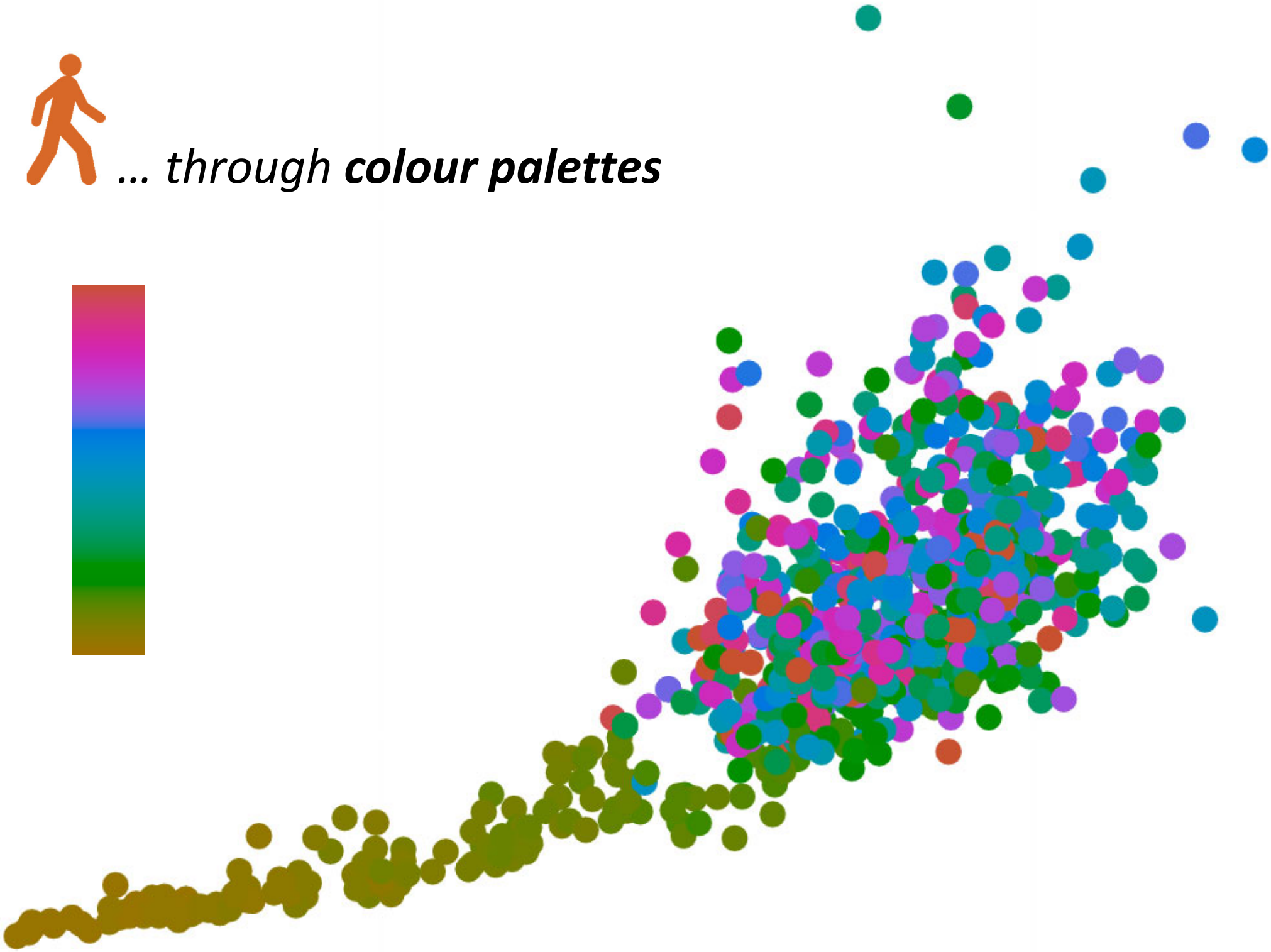
*… through **colour palettes***



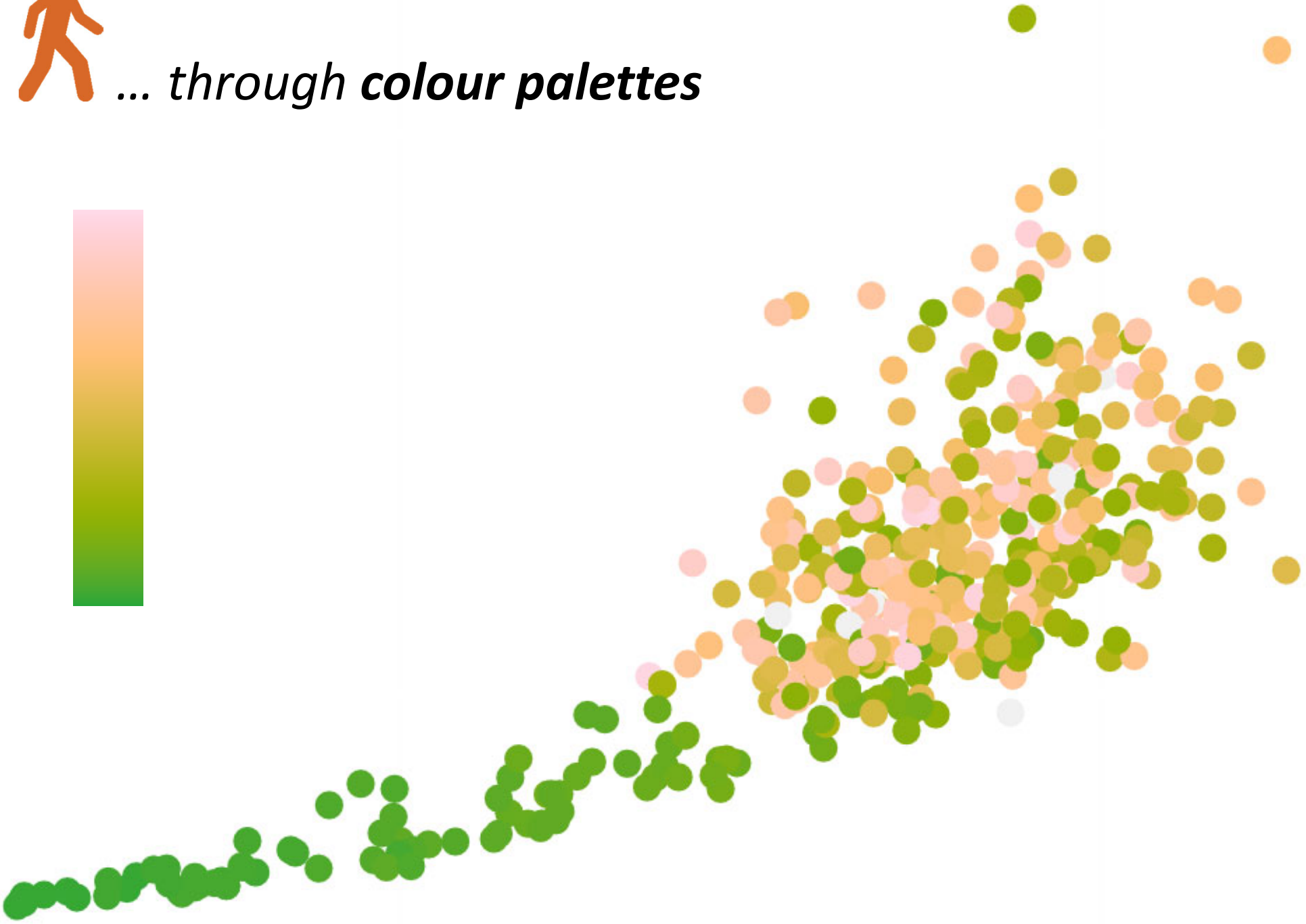
… through ***colour palettes***



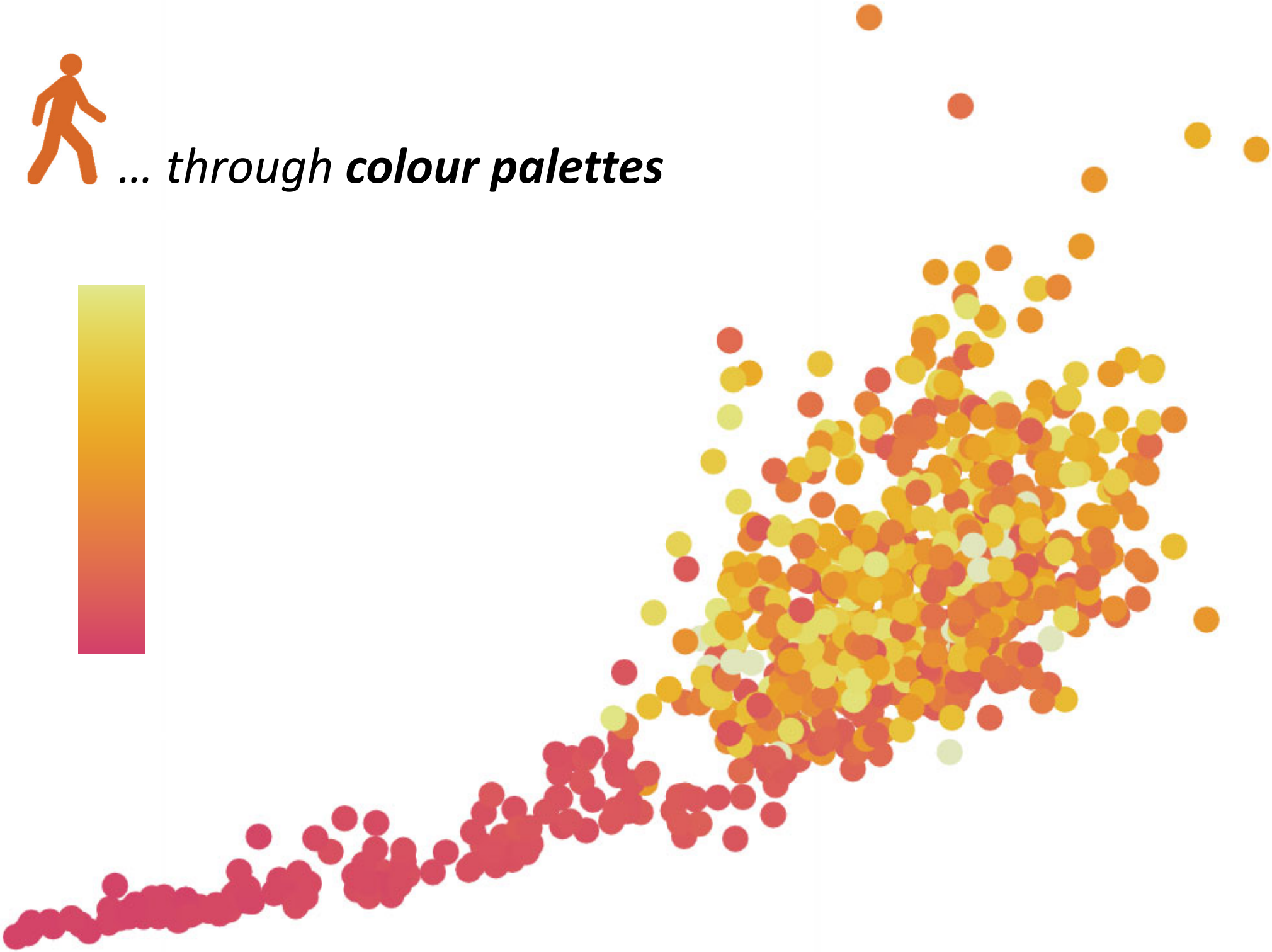
*… through **colour palettes***



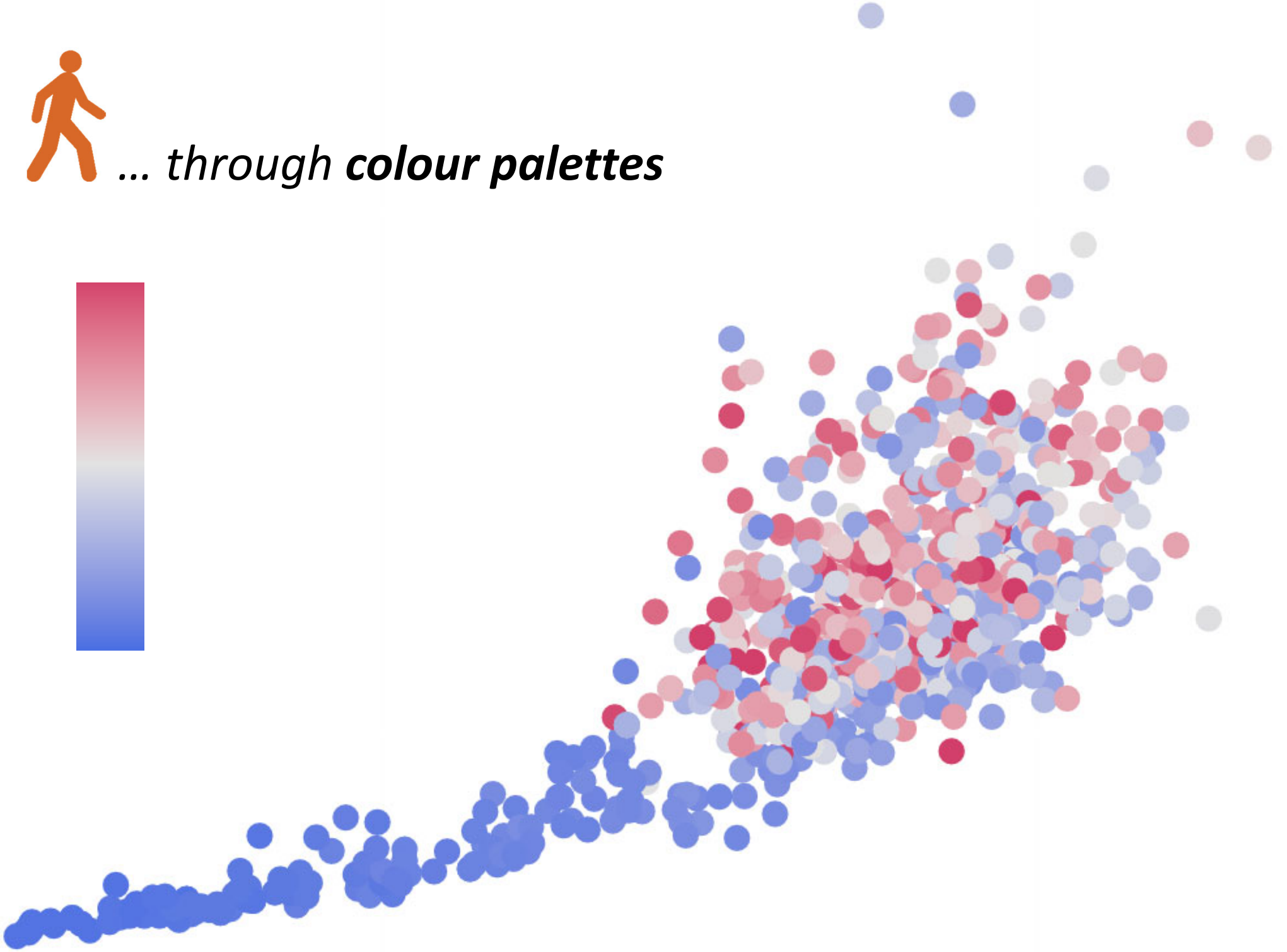
… through ***colour palettes***



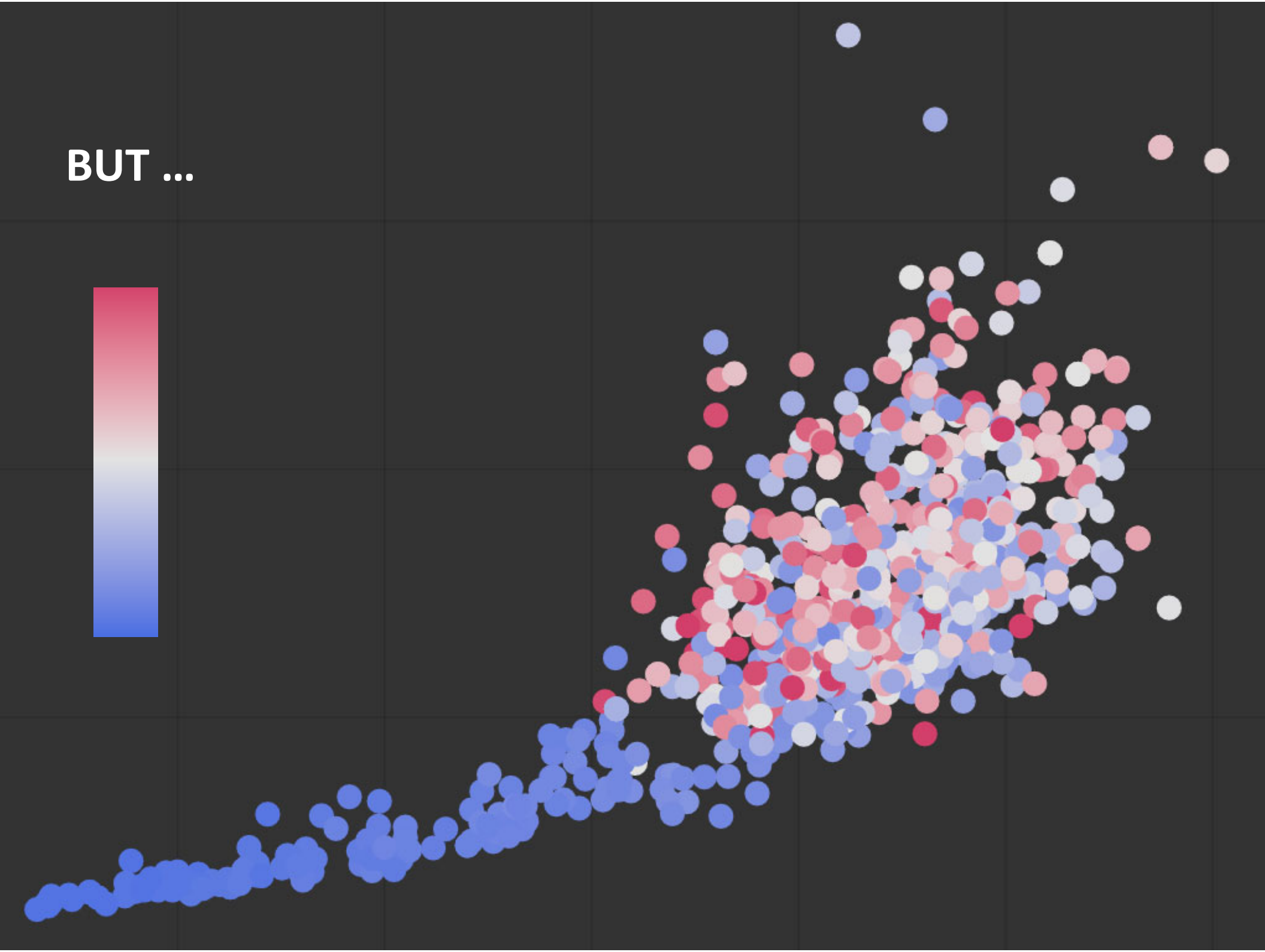
*… through **colour palettes***



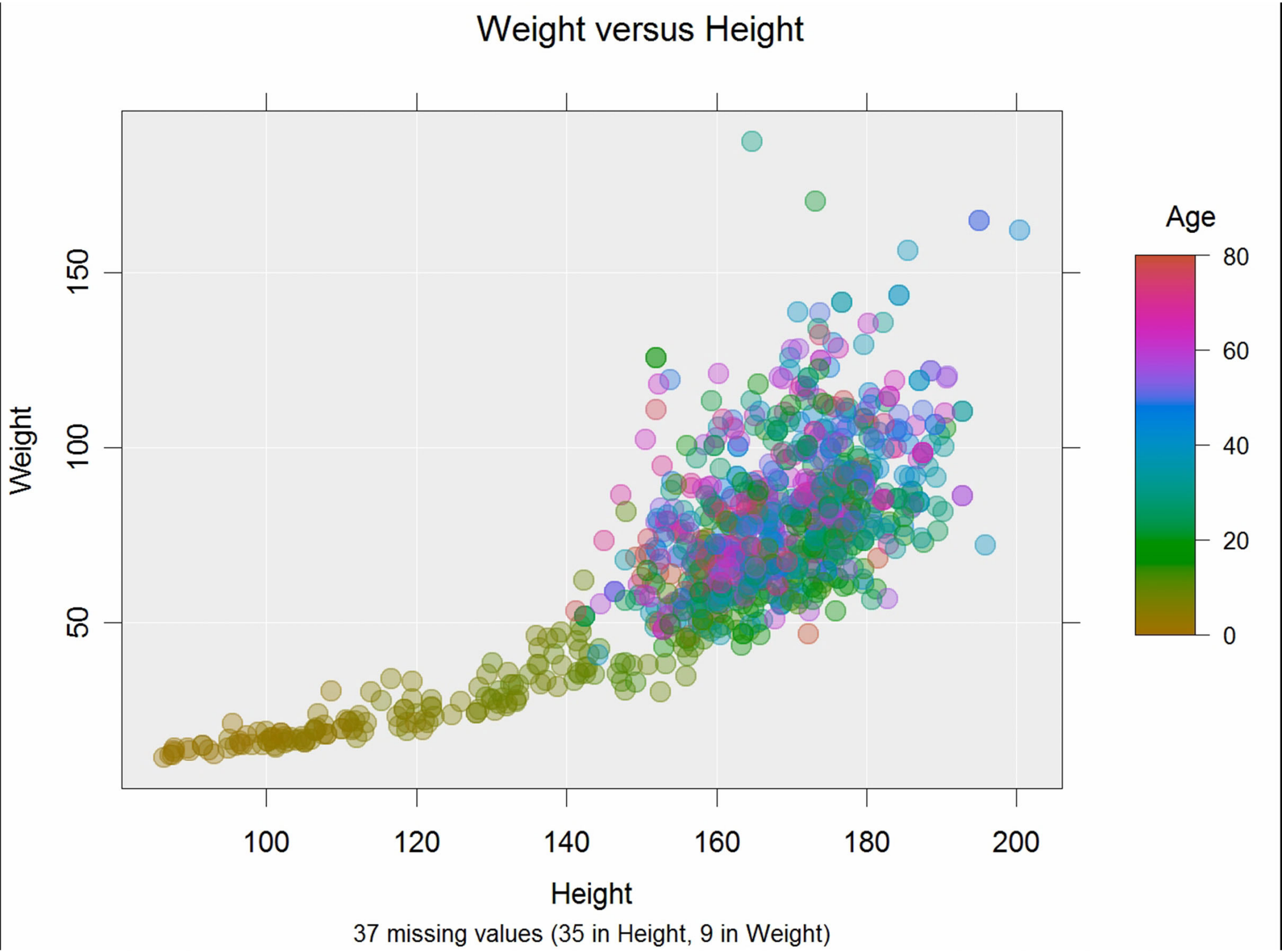
… through ***colour palettes***



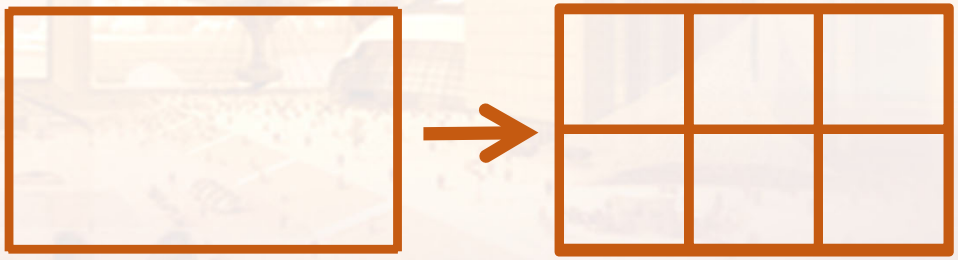
BUT …

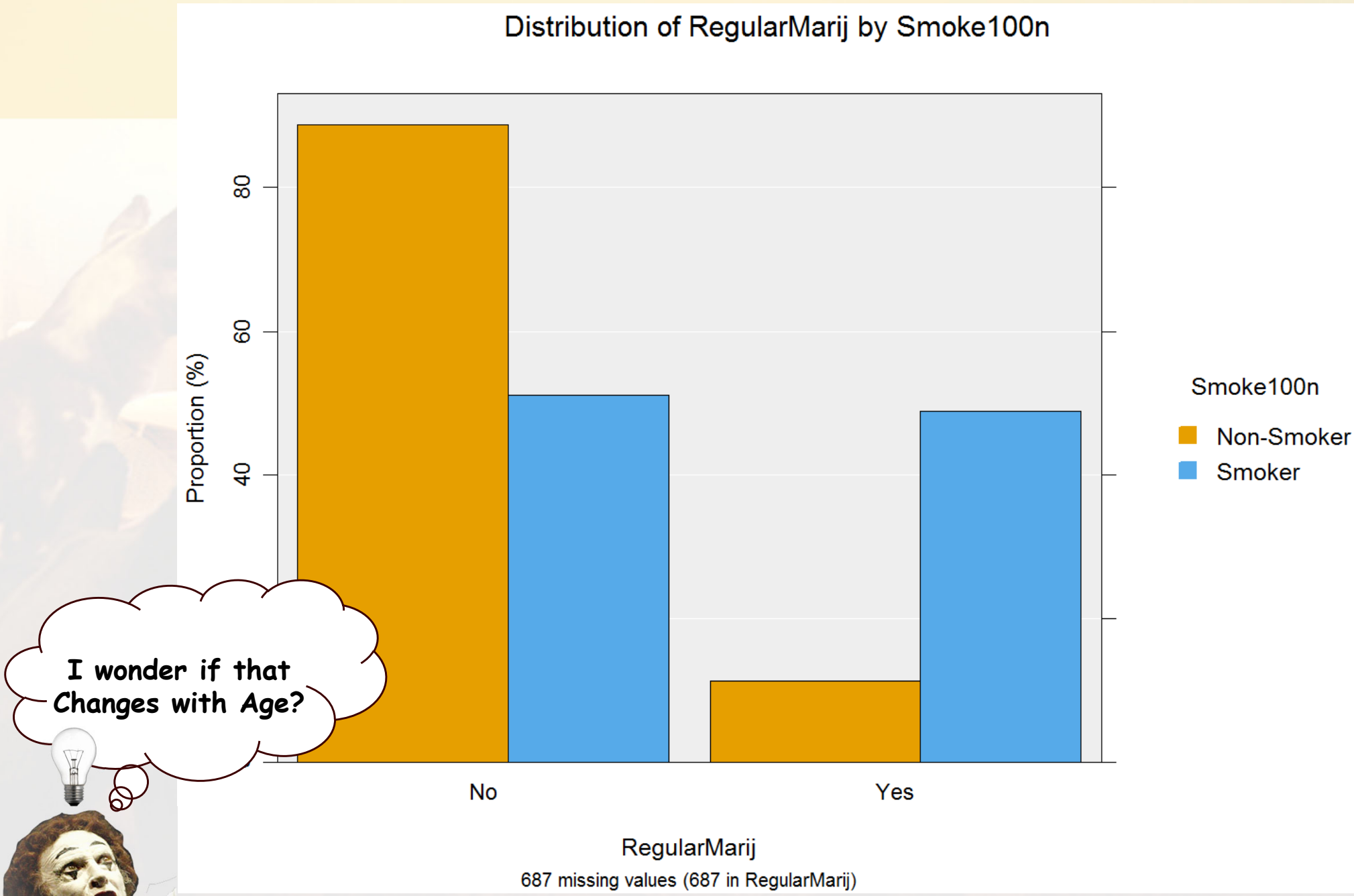


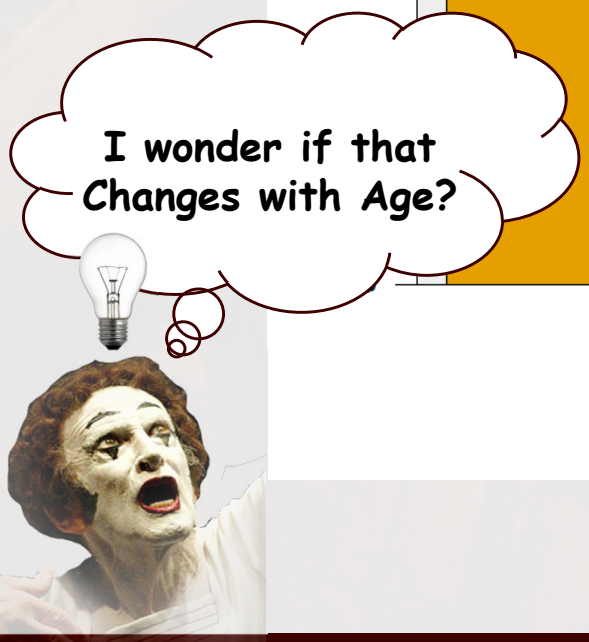
… through ***colour groups***

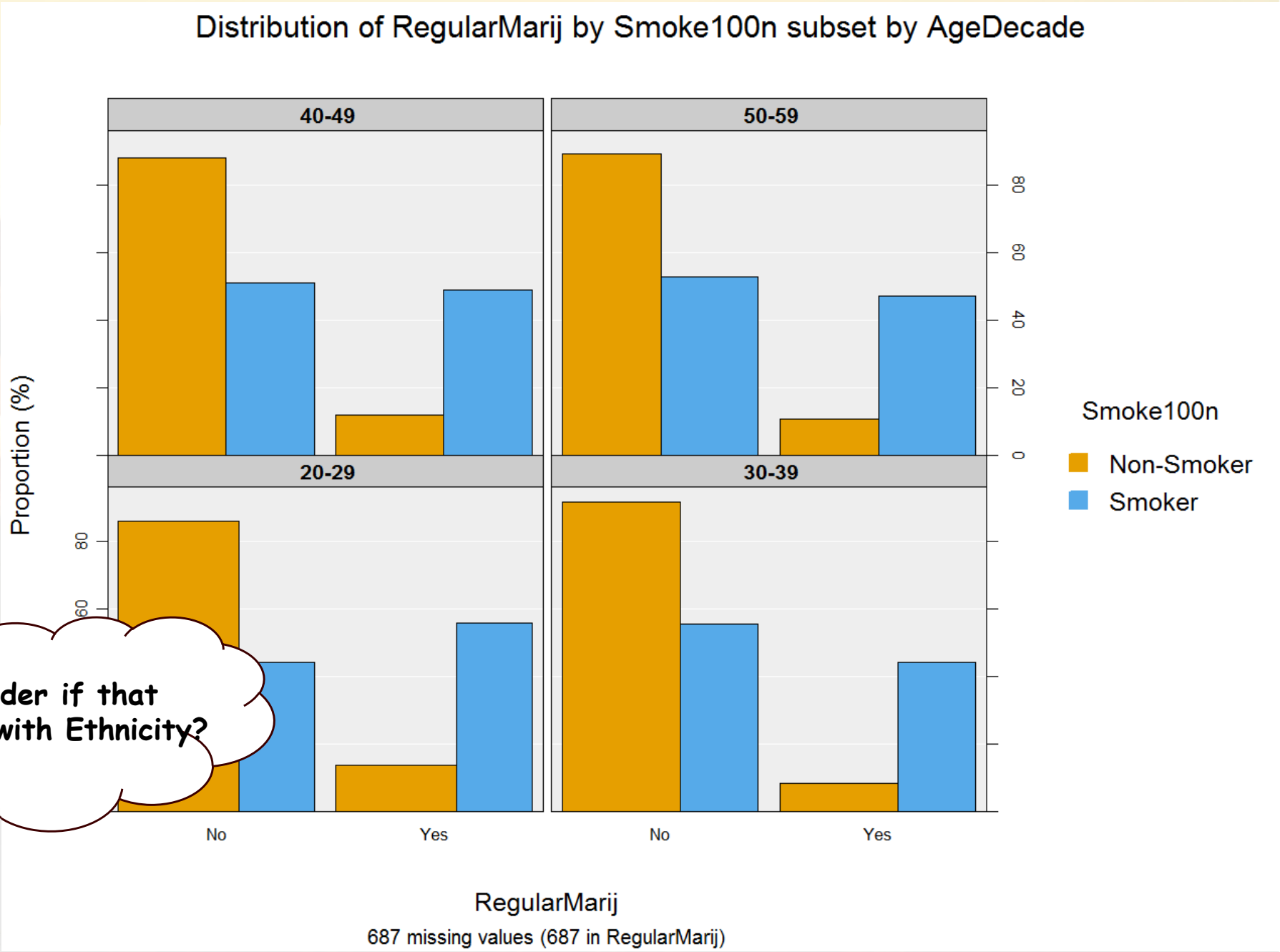

Weight versus Height
Weight
50
100
150
100
120
140
160
180
200
Height
37 missing values (35 in Height, 9 in Weight)
Age
80
60
40
20
0

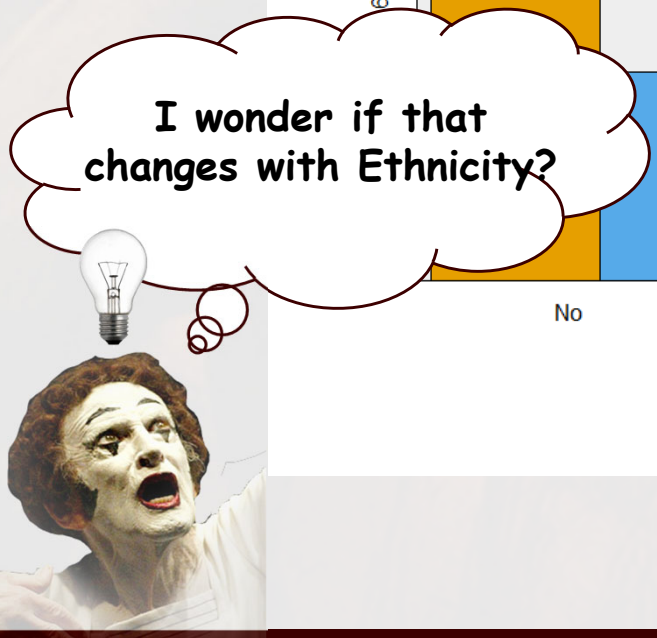
Subsetting …

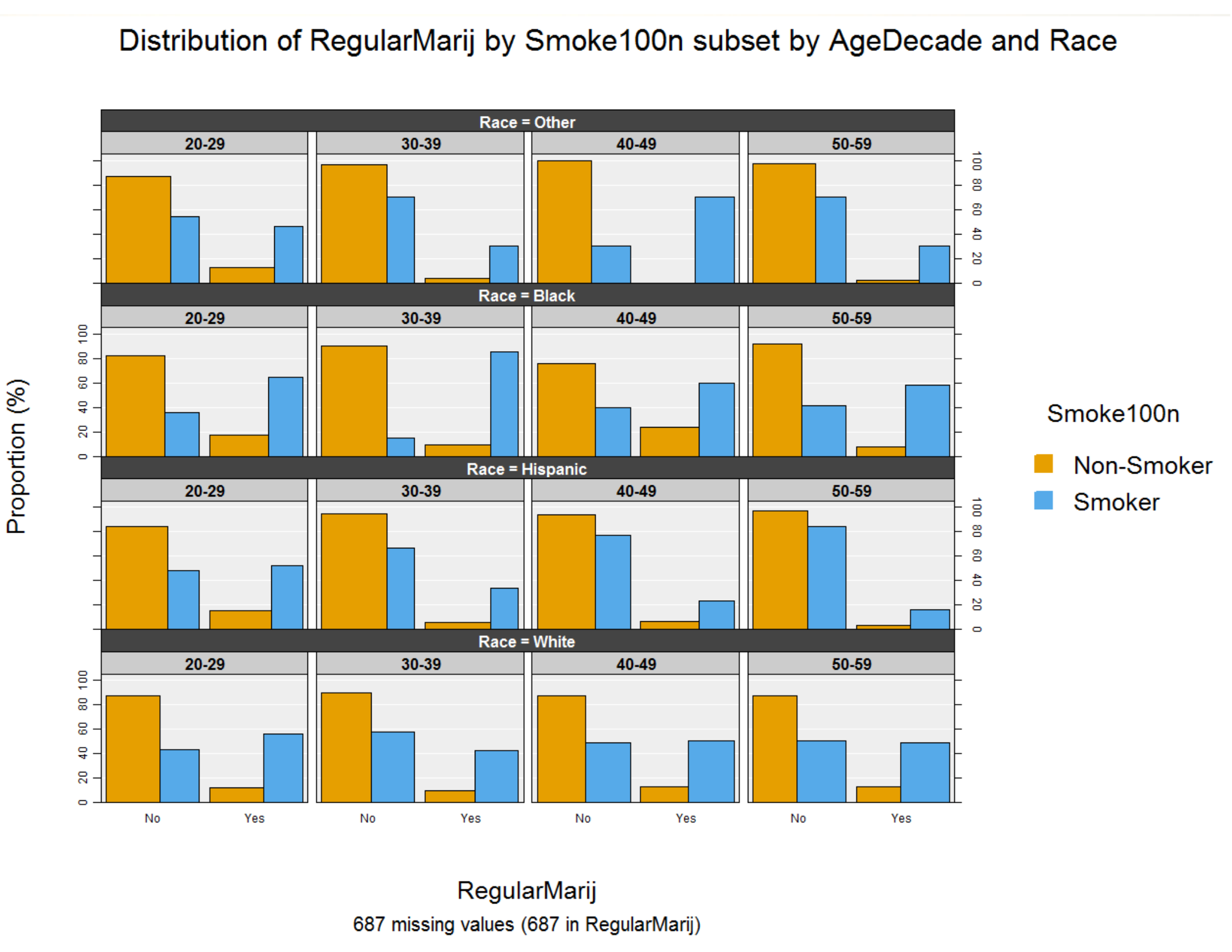



Distribution of RegularMarij by Smoke100n
Proportion (%)
80
60
40
No
Yes
RegularMarij
687 missing values (687 in RegularMarij)
Smoke100n
Non-Smoker
Smoker


I wonder if that
Changes with Age?

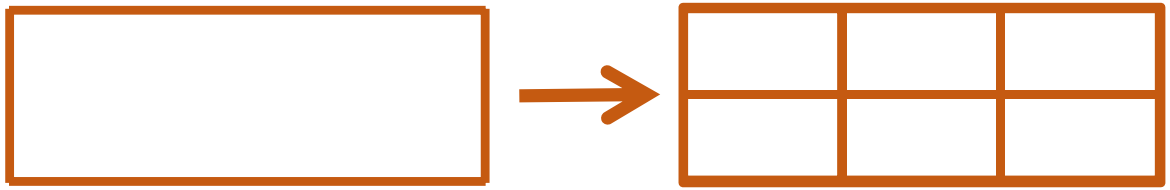

Distribution of RegularMarij by Smoke100n subset by AgeDecade
40-49
50-59
20-29
30-39
Proportion (%)
0
20
40
60
80
No
Yes
RegularMarij
687 missing values (687 in RegularMarij)
Smoke100n
Non-Smoker
Smoker


I wonder if that changes with Ethnicity?


Distribution of RegularMarij by Smoke100n subset by AgeDecade and Race
Race = Other
Race = Black
Race = Hispanic
Race = White
20-29
30-39
40-49
50-59
Proportion (%)
0
20
40
60
80
100
No
Yes
RegularMarij
687 missing values (687 in RegularMarij)
Smoke100n
Non-Smoker
Smoker

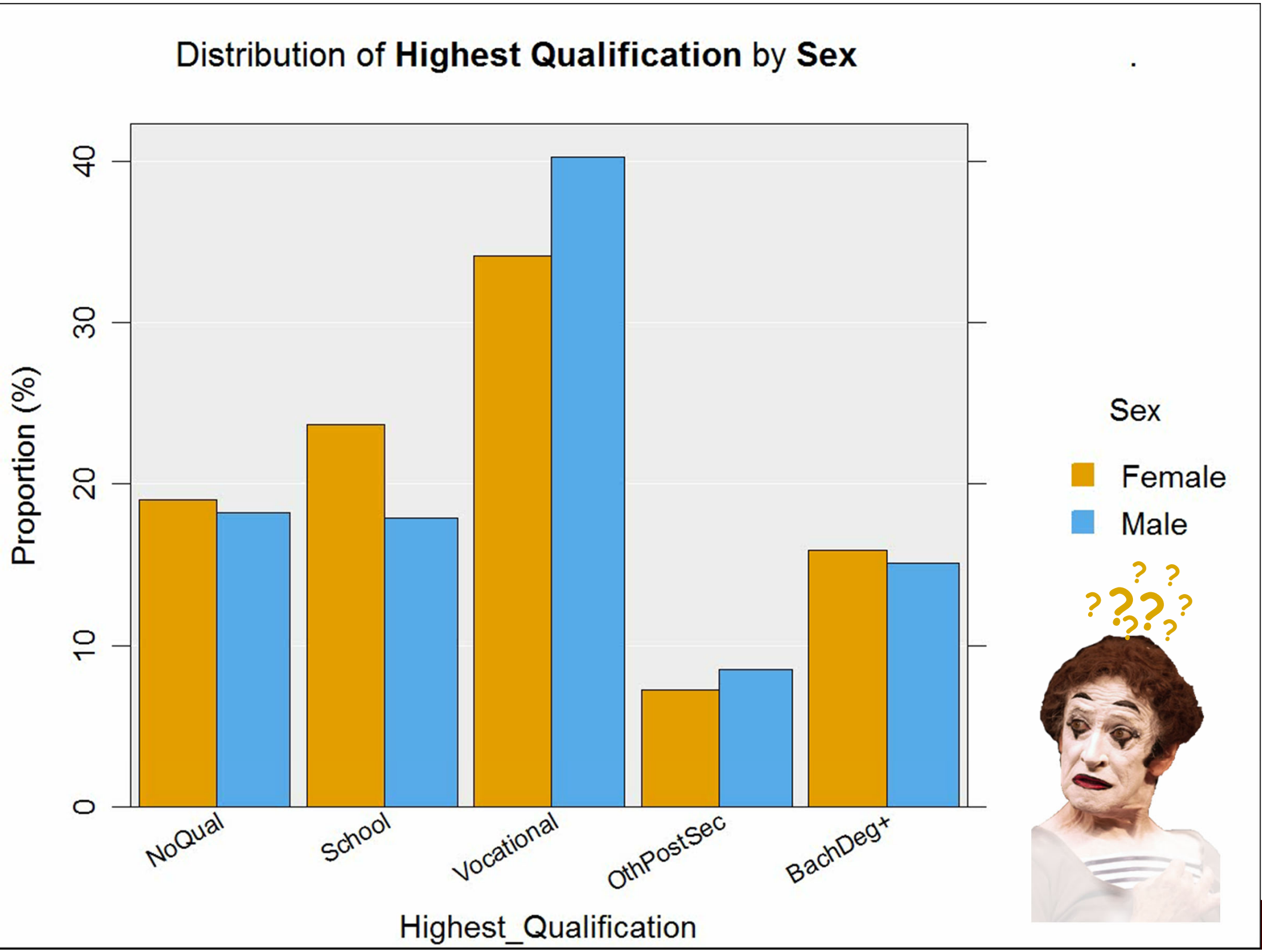
Motion …

Mathematically speaking …

Subsetting 

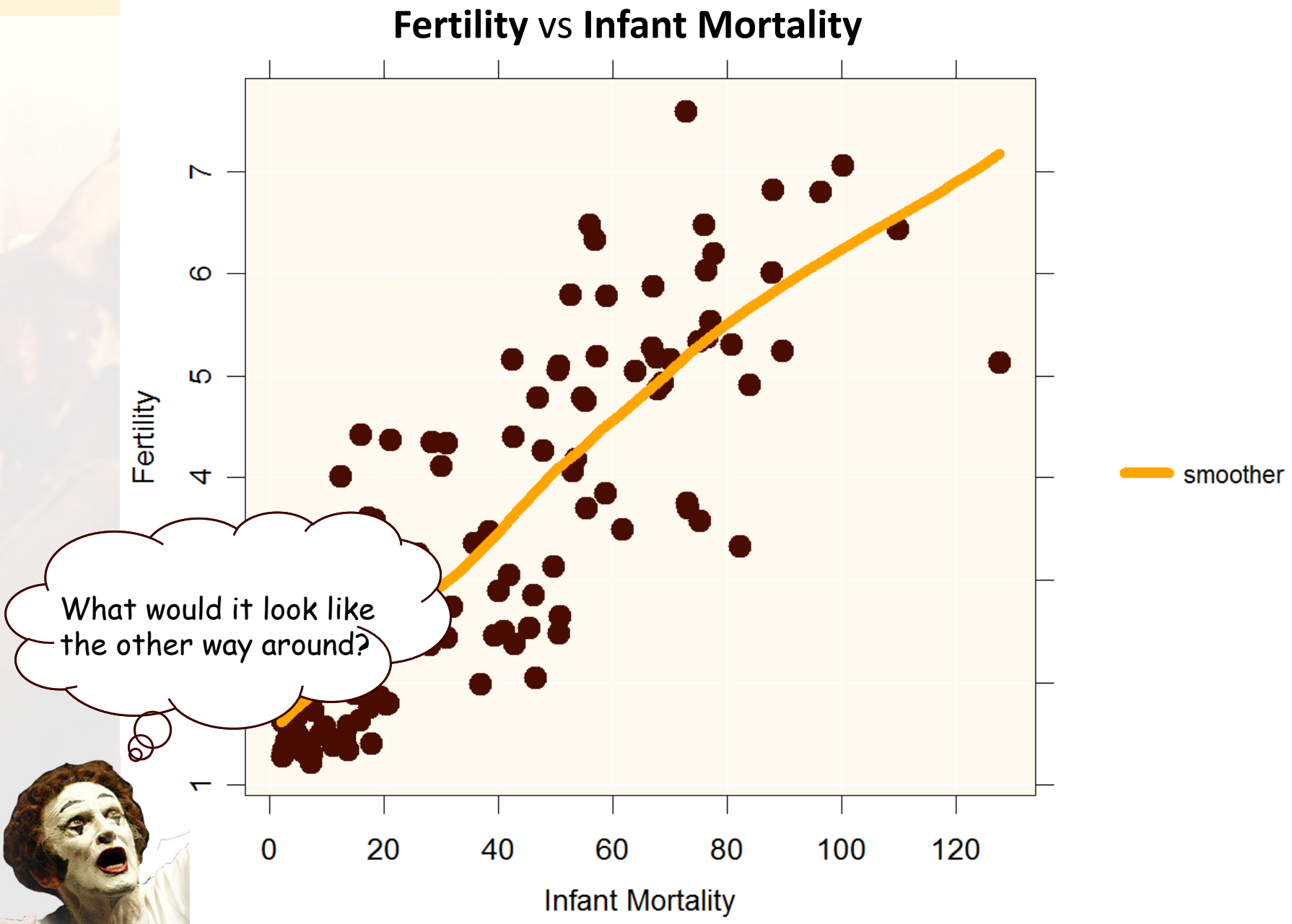
\+  **… Stepping** through subsets

=  **Motion …**

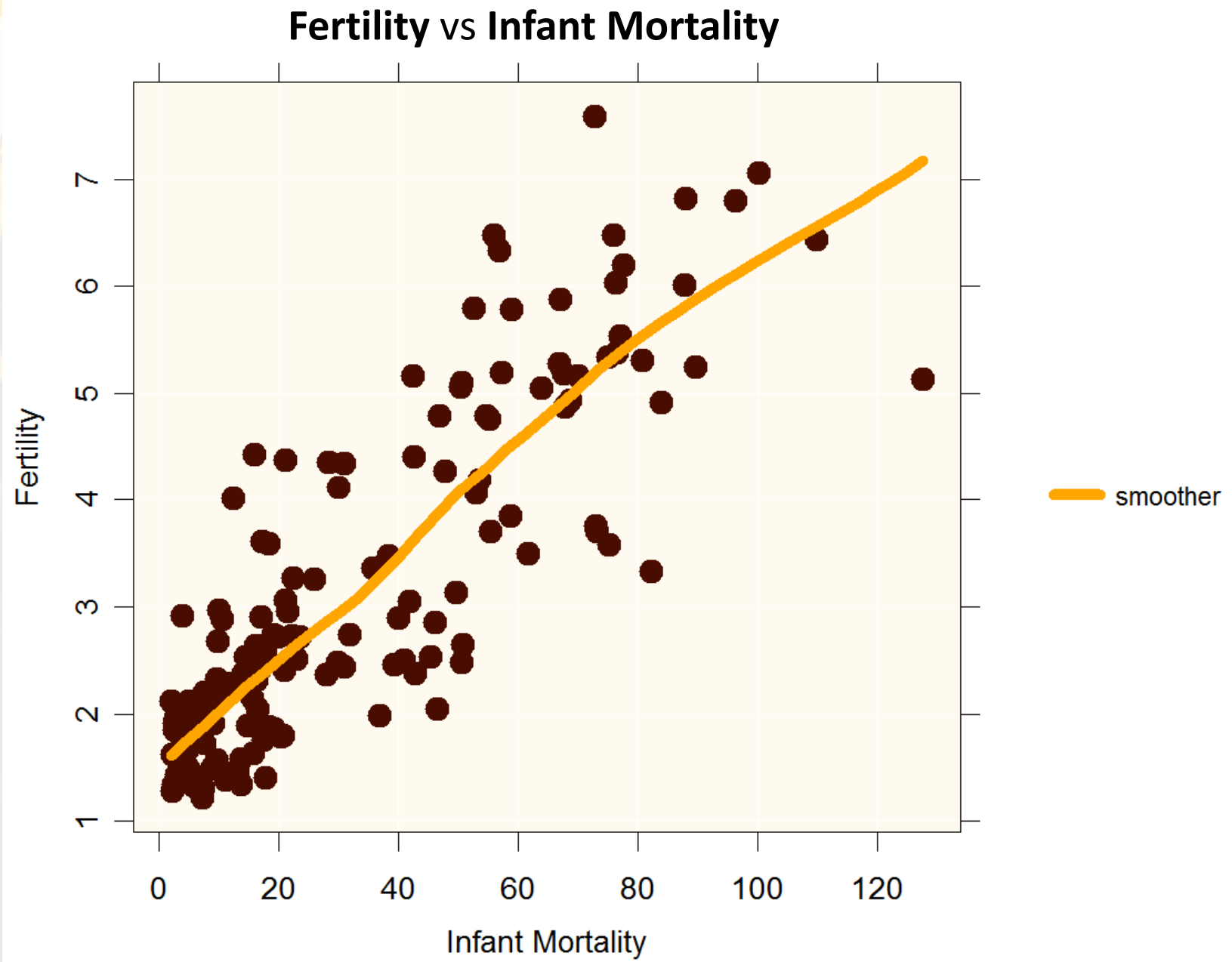

Distribution of Highest Qualification by Sex
Proportion (%)
0
10
20
30
40
NoQual
School
Vocational
OthPostSec
BachDeg+
Highest_Qualification
Sex
Female
Male

Bait & switch …

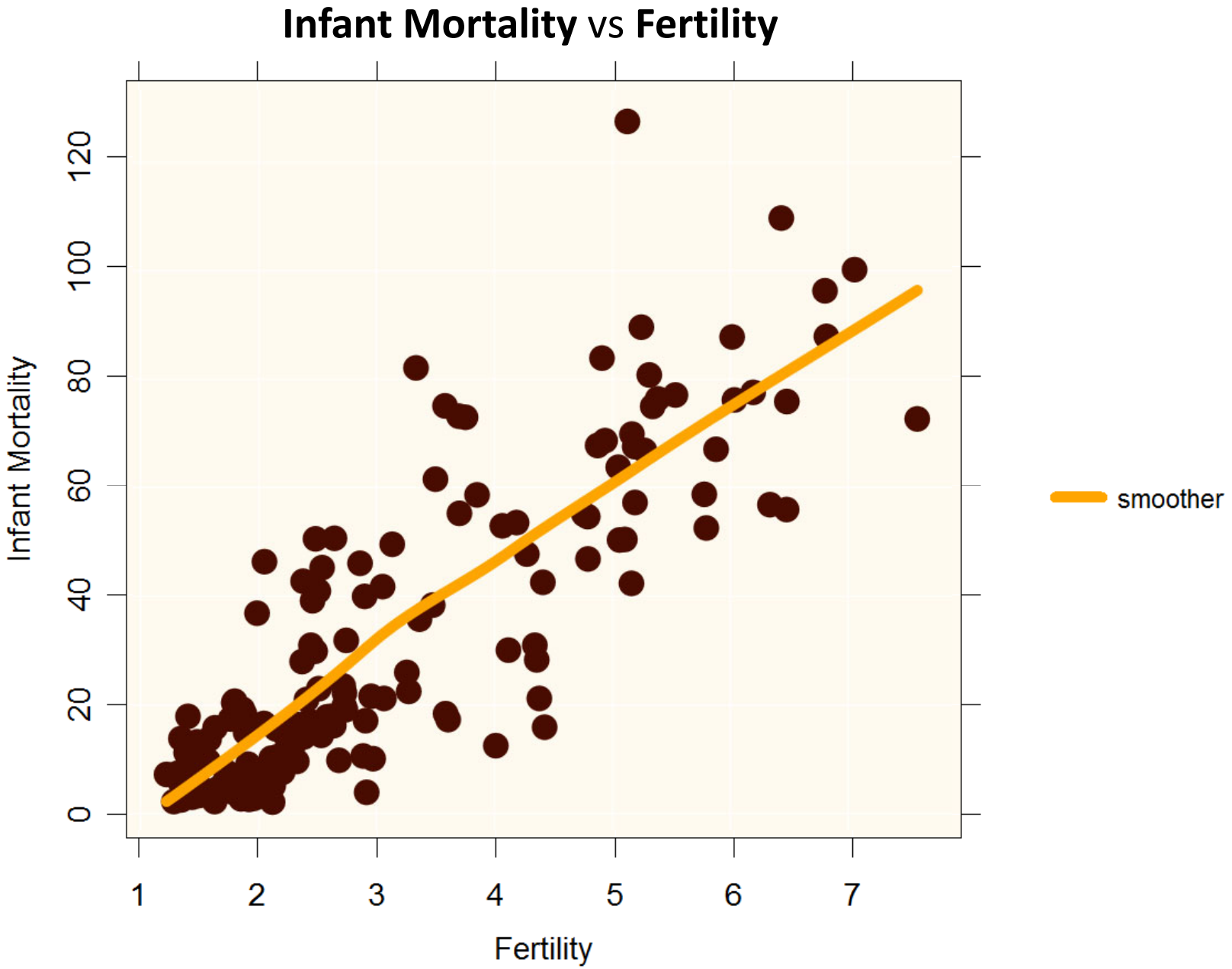
Switching the roles of variables: Switching "X and Y"



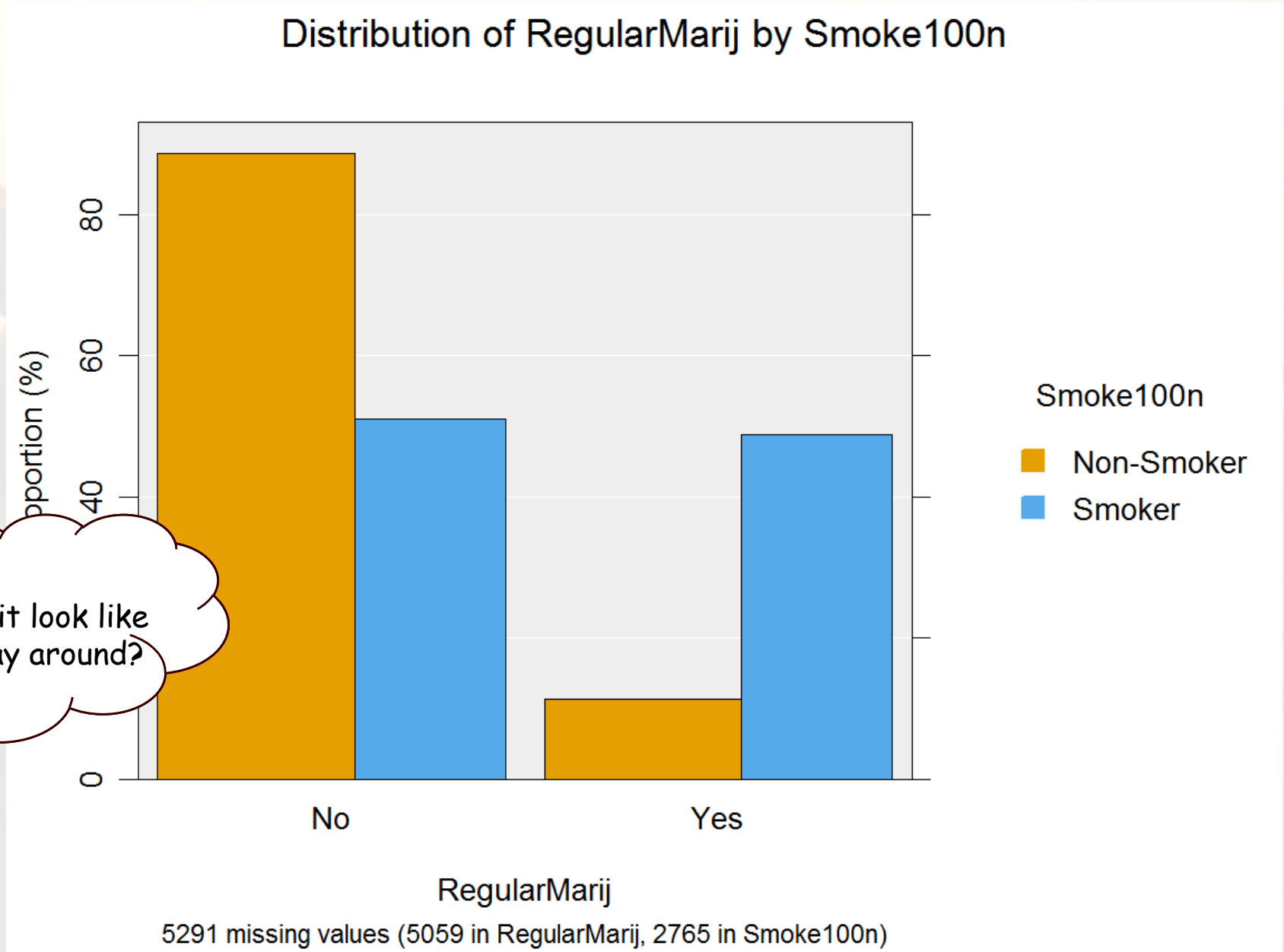
Switching the roles of variables: Switching "X and Y"

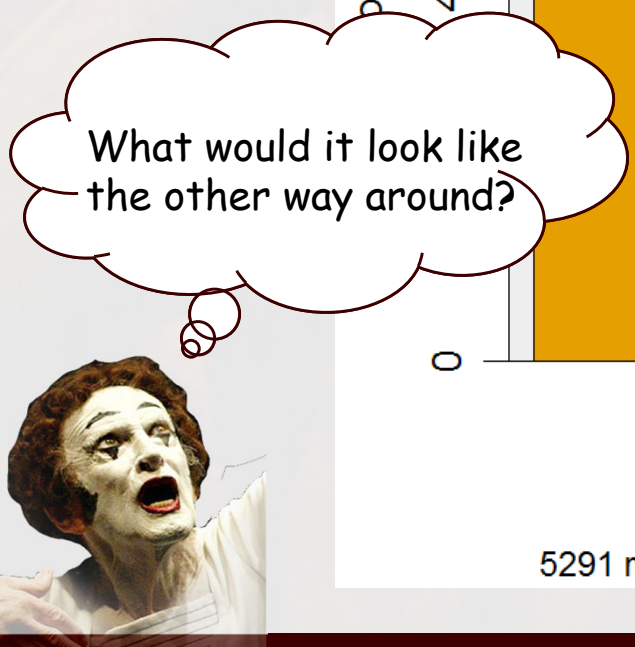


Switching the roles of variables: Switching "X and Y"

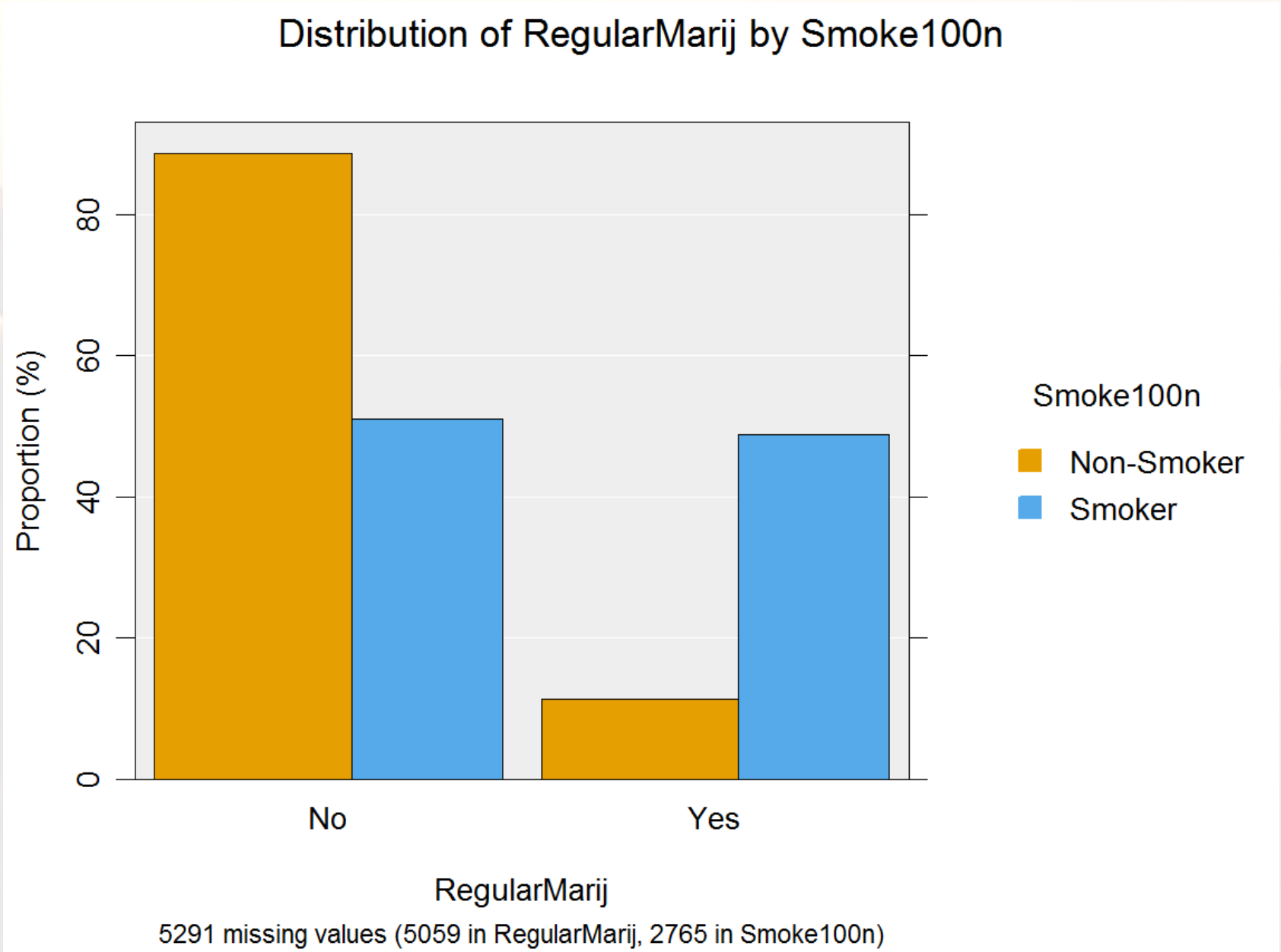


2-way table switching “X and Y”

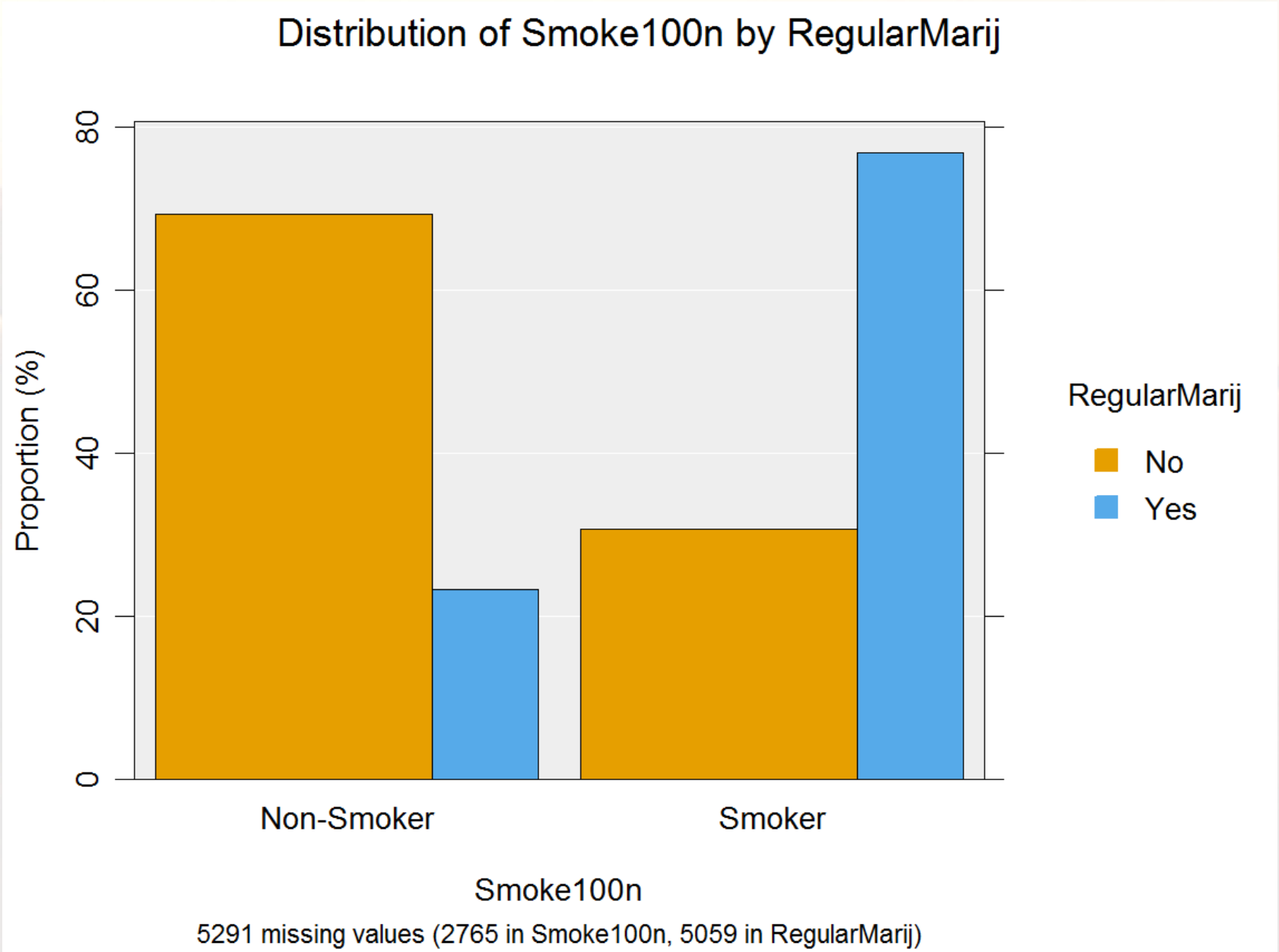




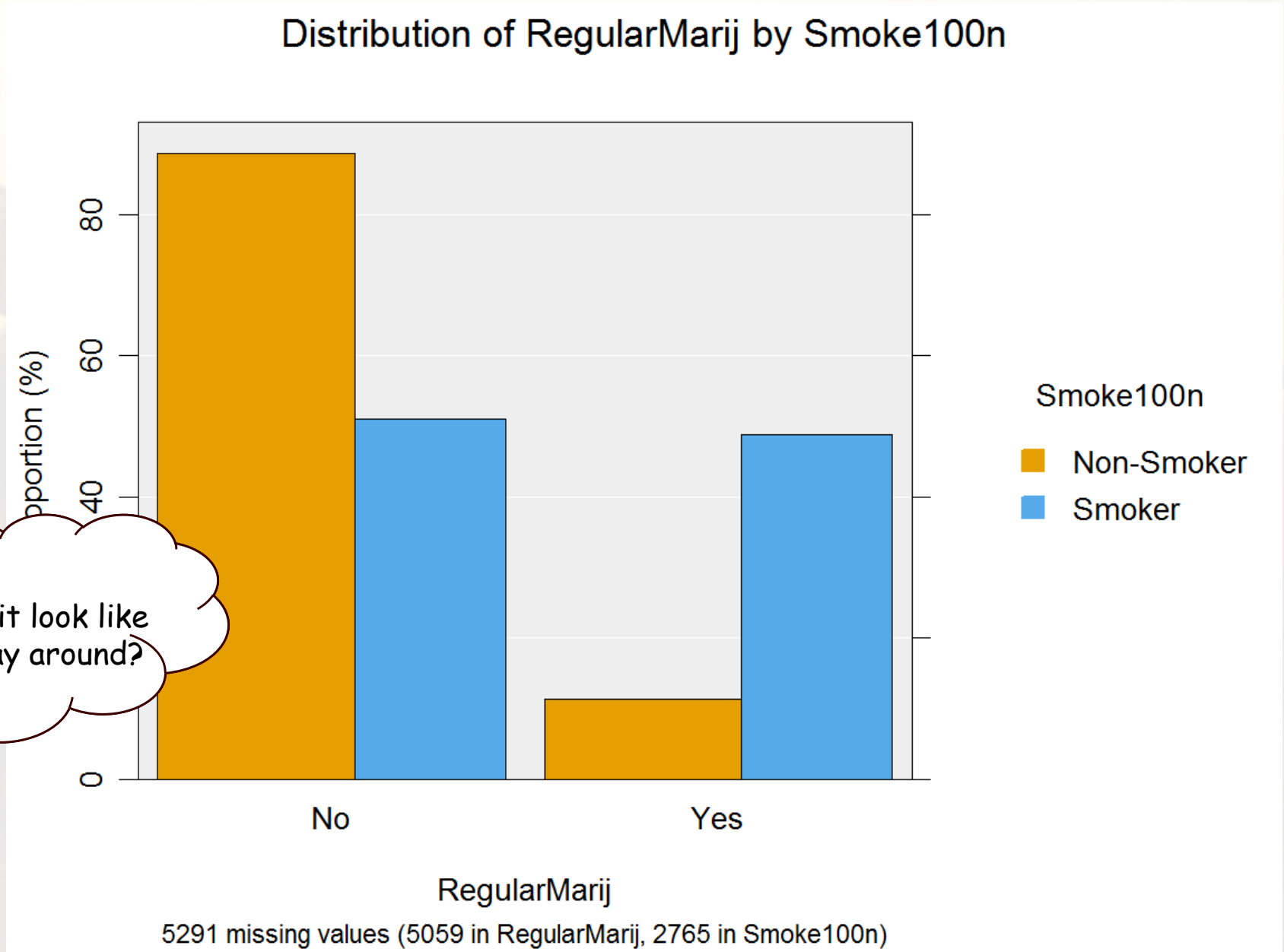
2-way table switching “X and Y”

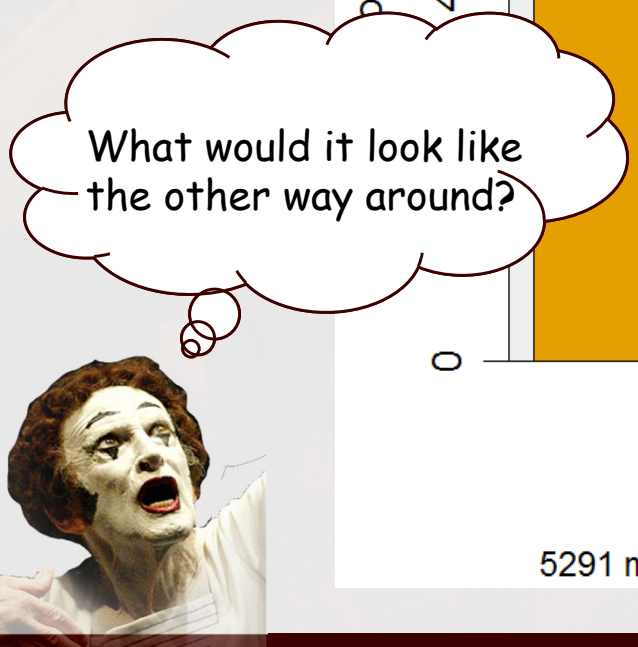


2-way table switching “X and Y”

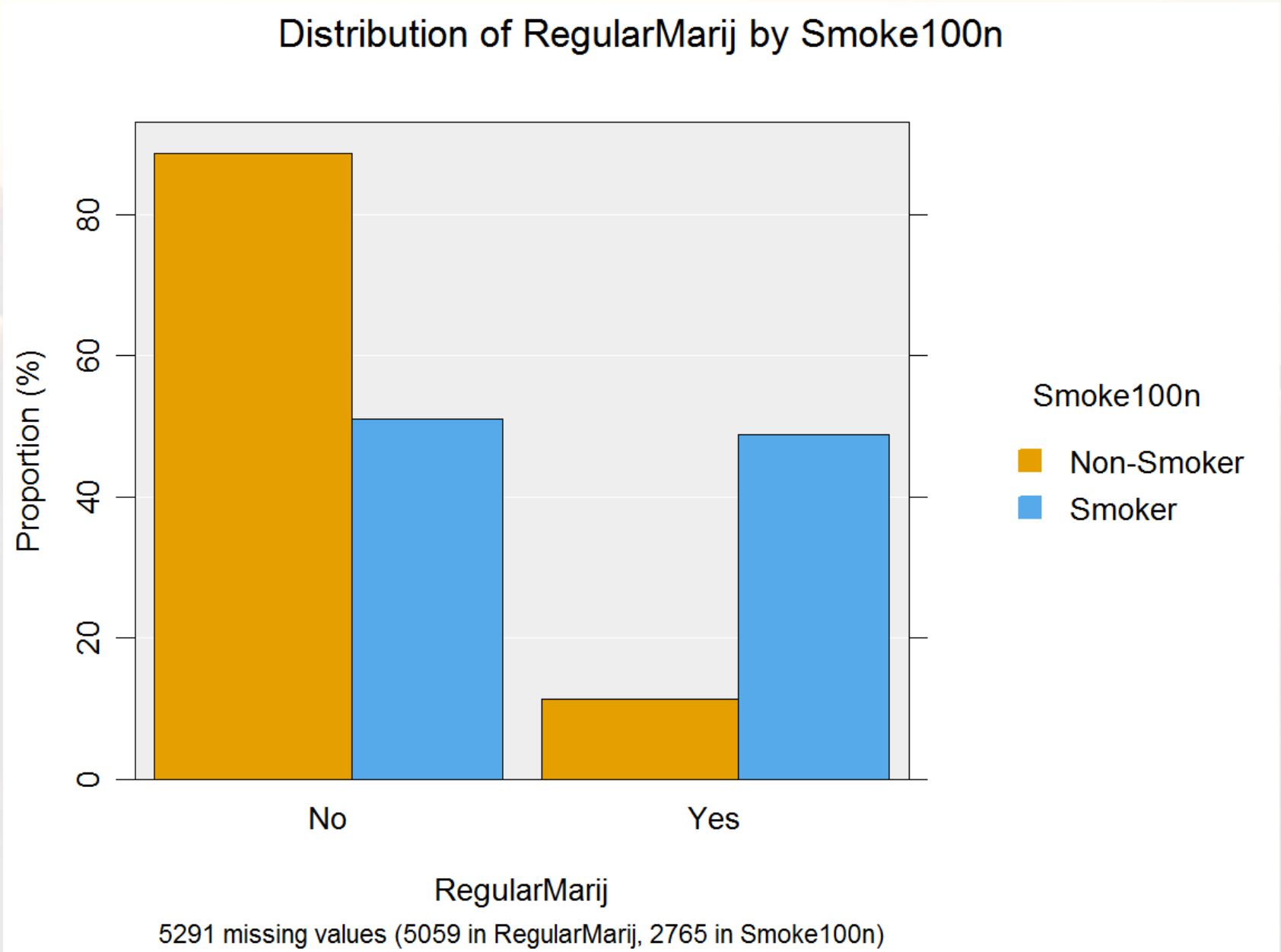


2-way table **switching representations**

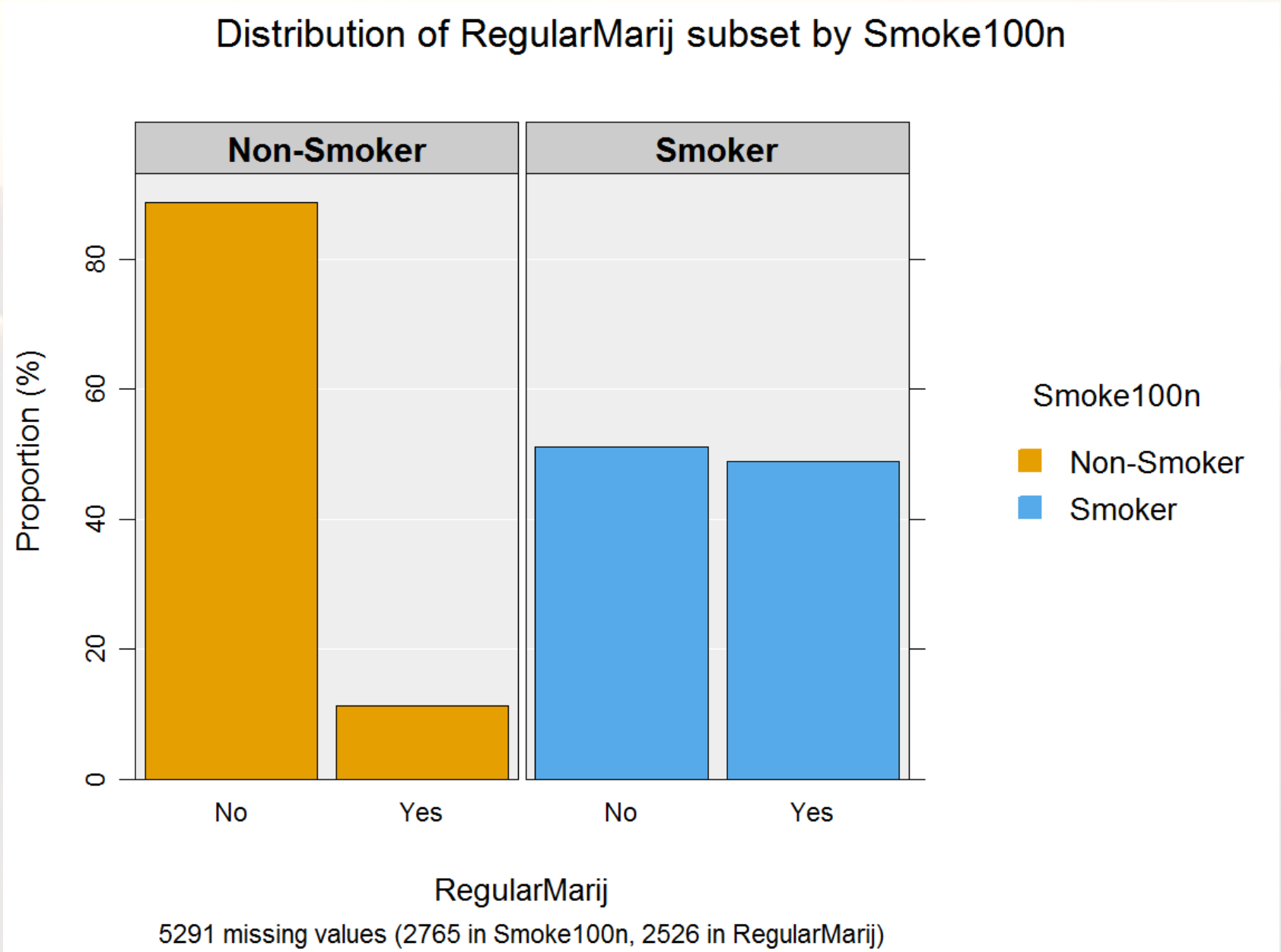




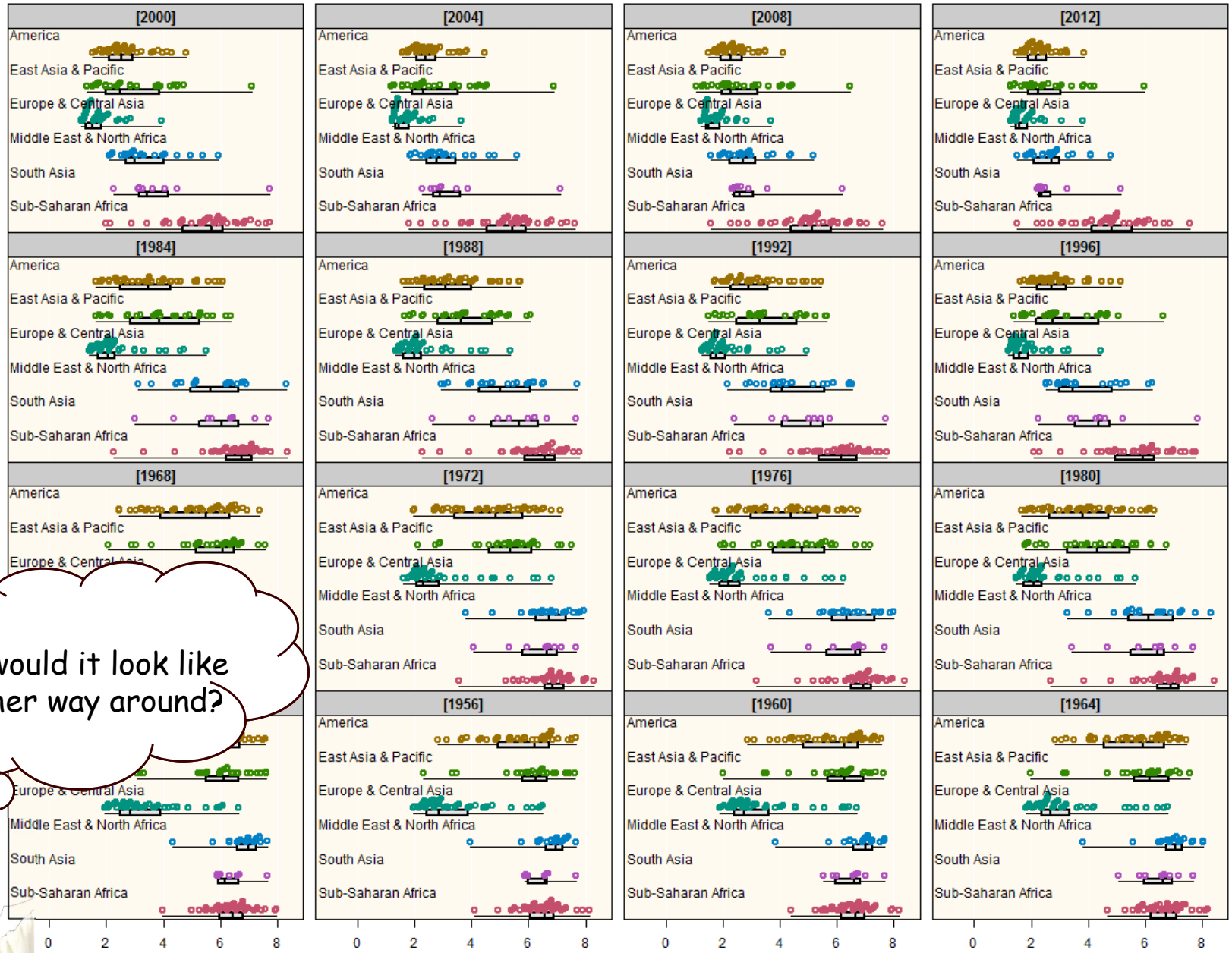
2-way table **switching representations**

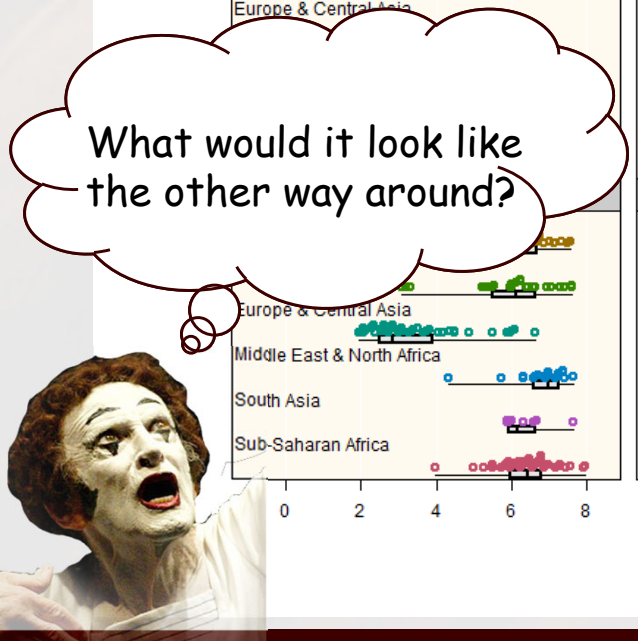


2-way table **switching representations**

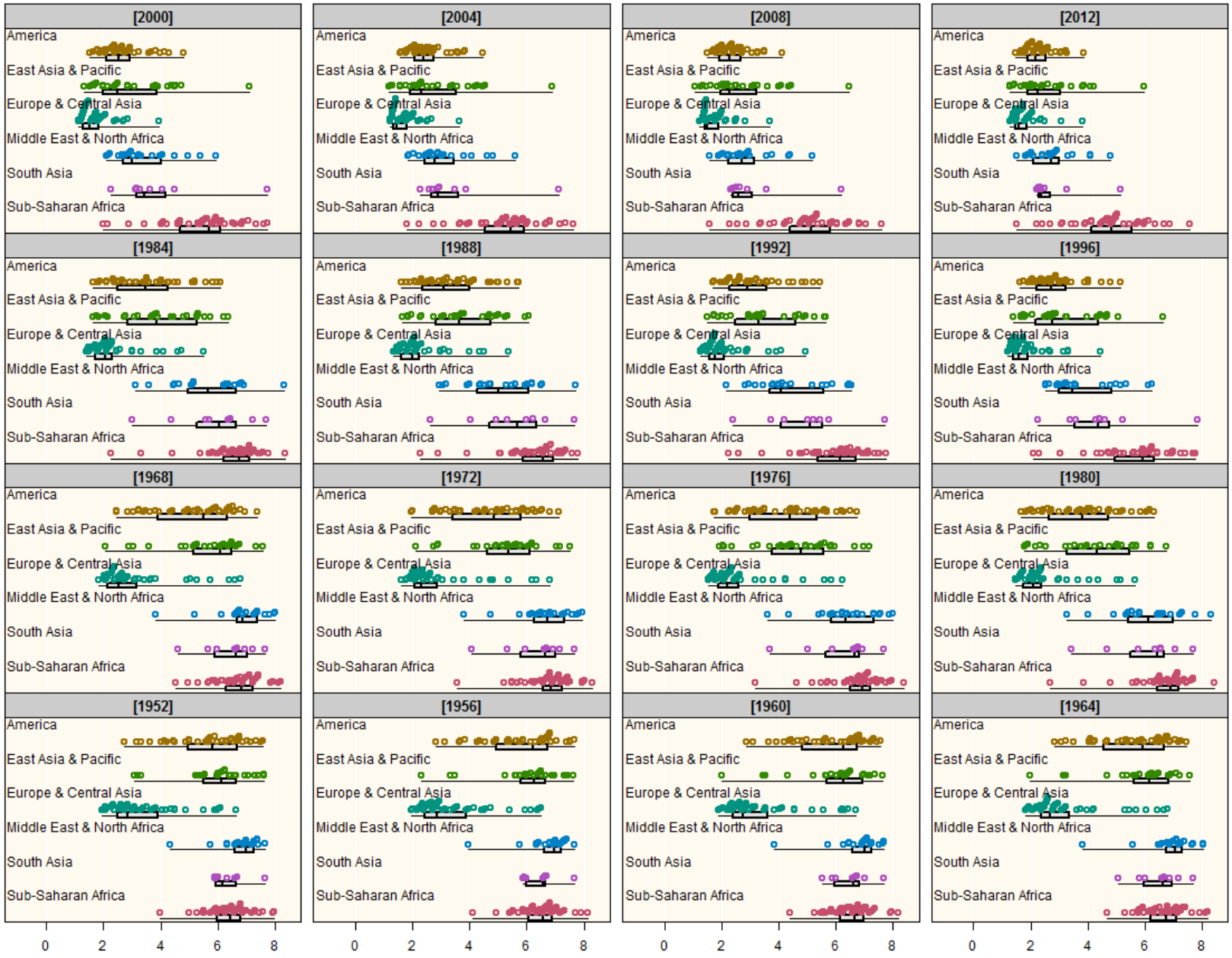


Fertility by Region *subset* by Year

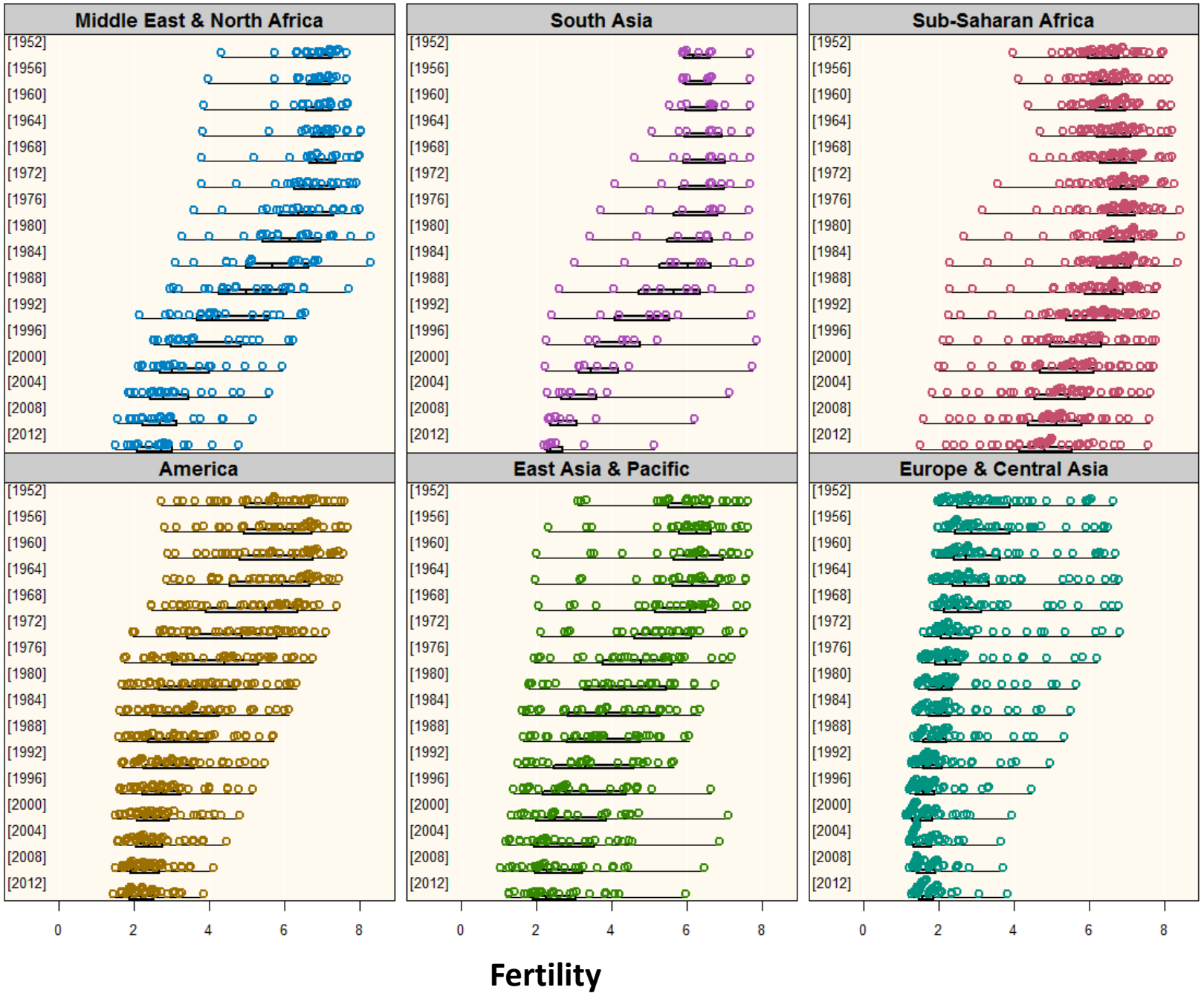




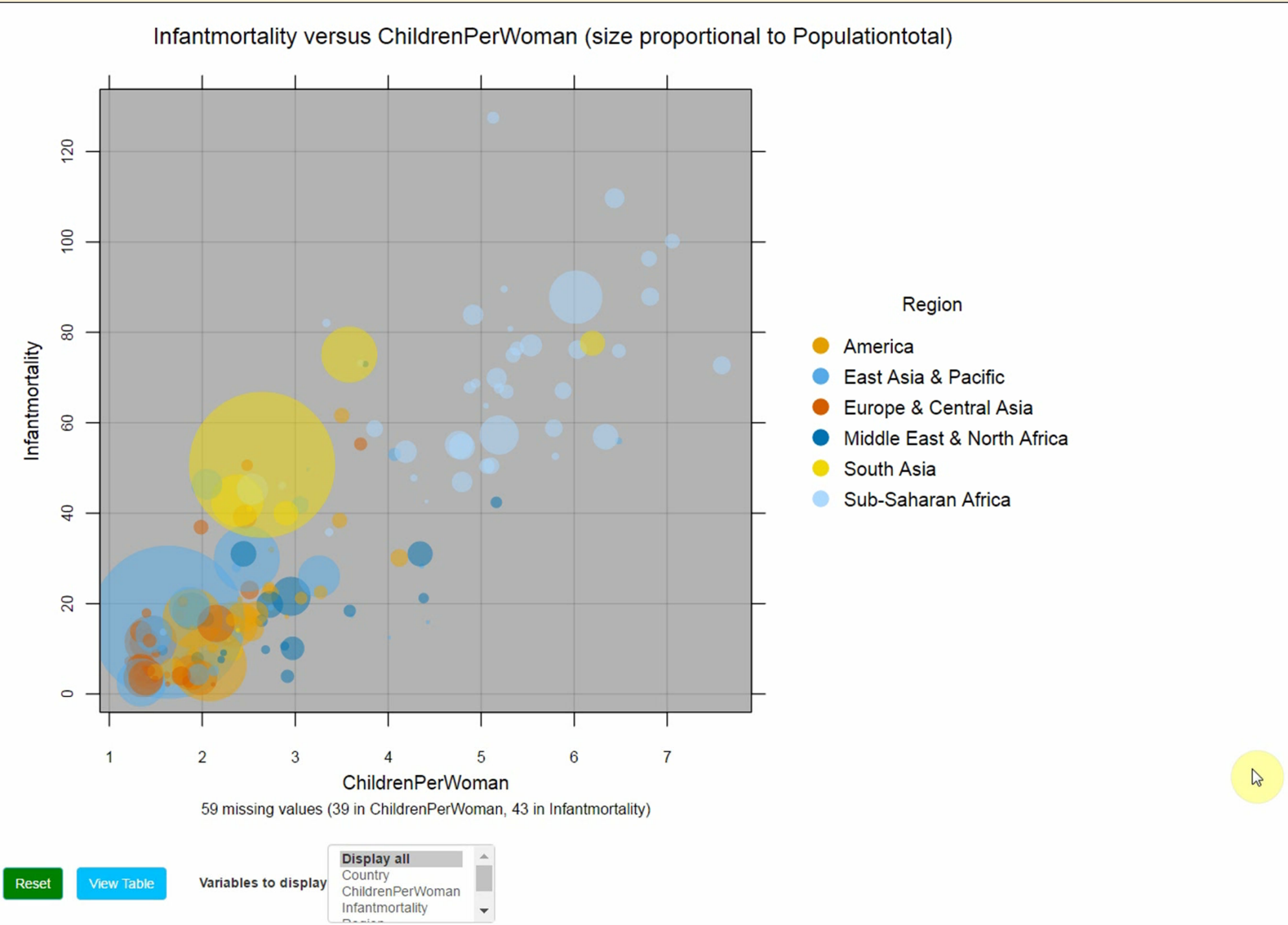
Fertility by Region *subset* by Year



Fertility by Year *subset* by Region



Identification & brushing …


Infantmortality versus ChildrenPerWoman (size proportional to Populationtotal)
Infantmortality
0
20
40
60
80
100
120
1
2
3
4
5
6
7
ChildrenPerWoman
59 missing values (39 in ChildrenPerWoman, 43 in Infantmortality)
Region
America
East Asia & Pacific
Europe & Central Asia
Middle East & North Africa
South Asia
Sub-Saharan Africa
Reset
View Table
Variables to display
Display all
Country
ChildrenPerWoman
Infantmortality

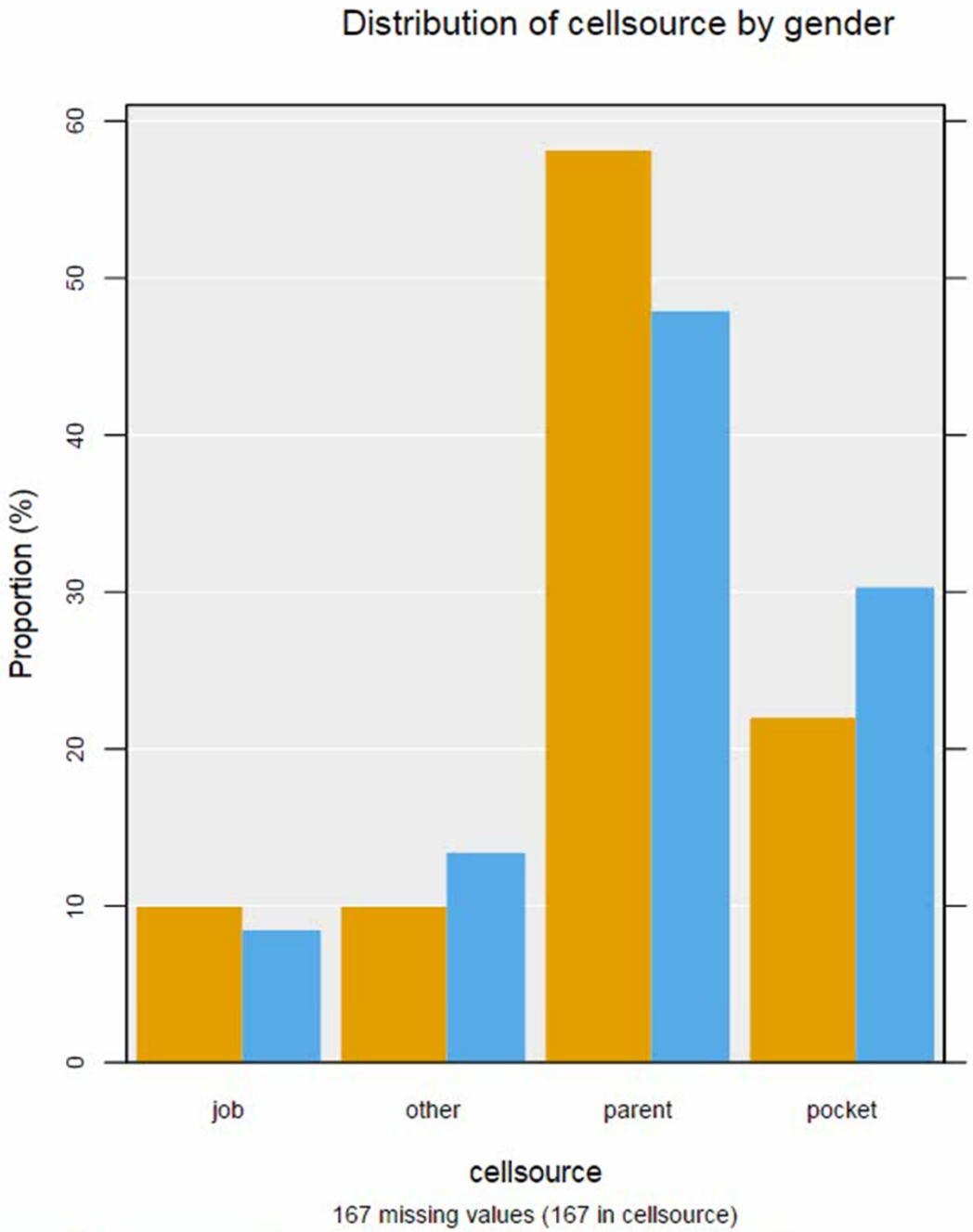


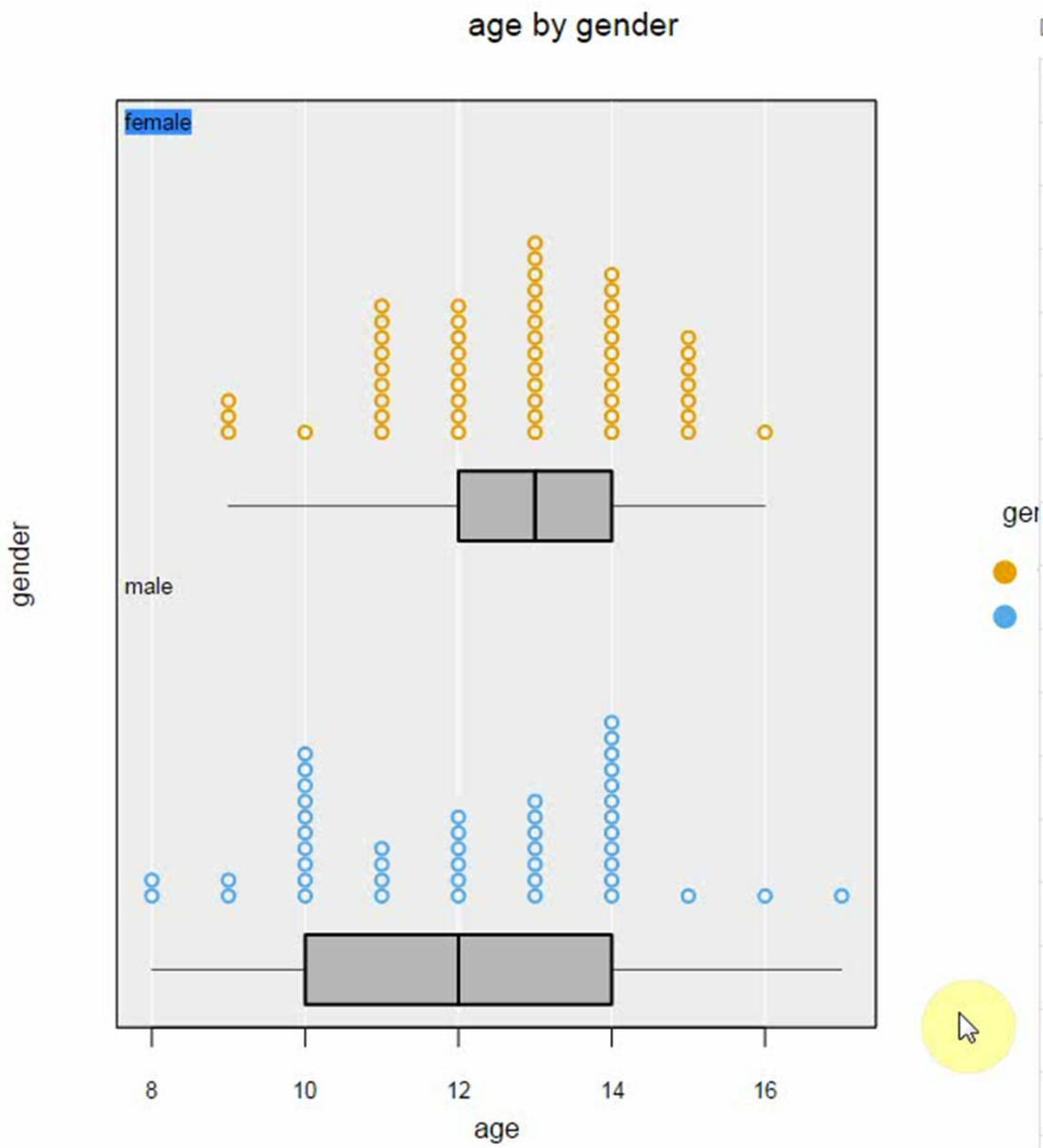
Table of Counts and Proportions

	cellsource					
gender	**job**	**other**	**parent**	**pocket**	**Total**	**Row N**
female	0.0995	0.0995	0.5812	0.2199	1.0000	**191**
male	0.0845	0.1338	0.4789	0.3028	1.0000	**142**
Col N	**0.0931**	**0.1141**	**0.5375**	**0.2553**	**1**	**N = 333**

gender

female

male



Reset | Hide Table

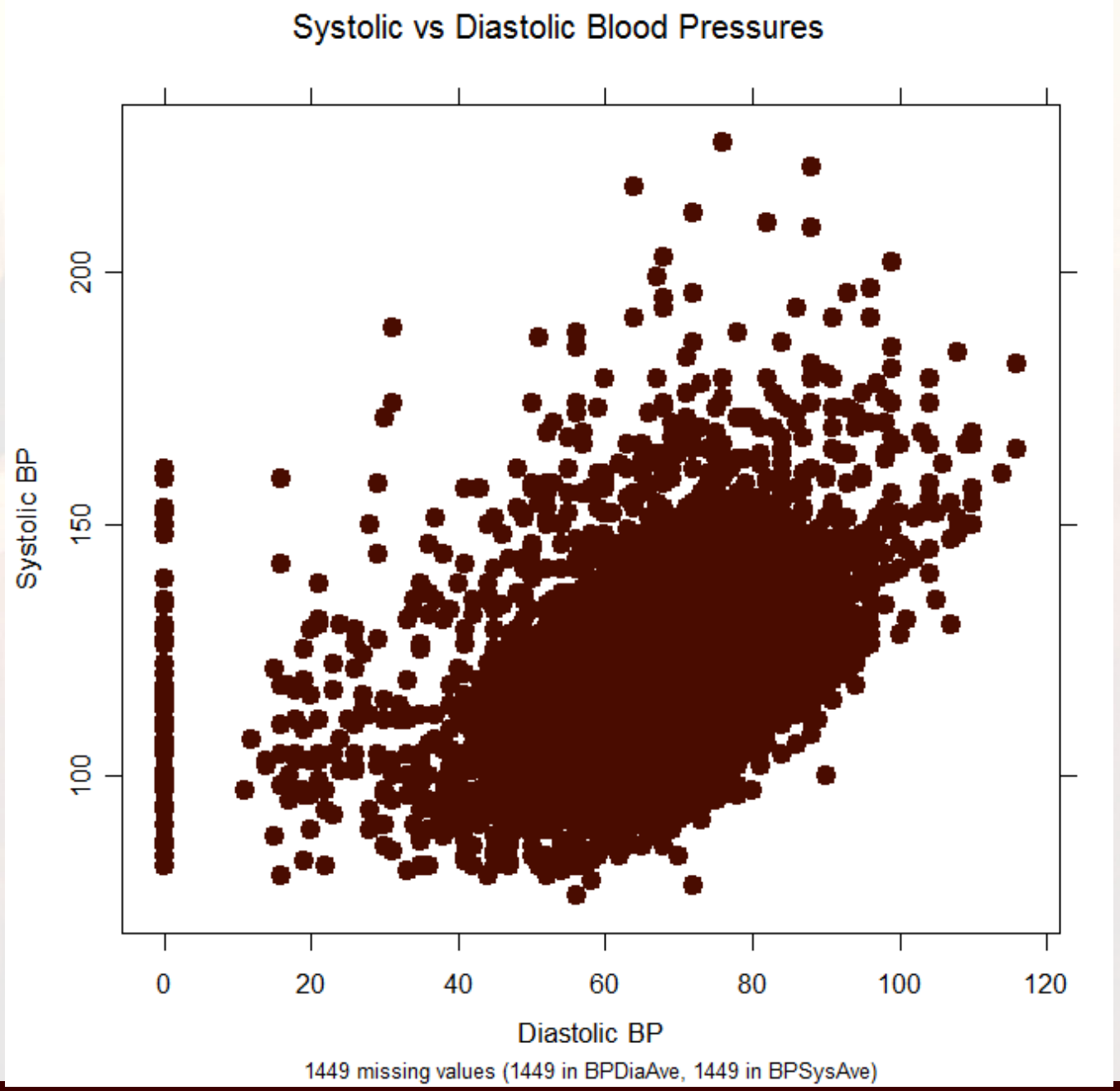
Display all
age
gender

Data

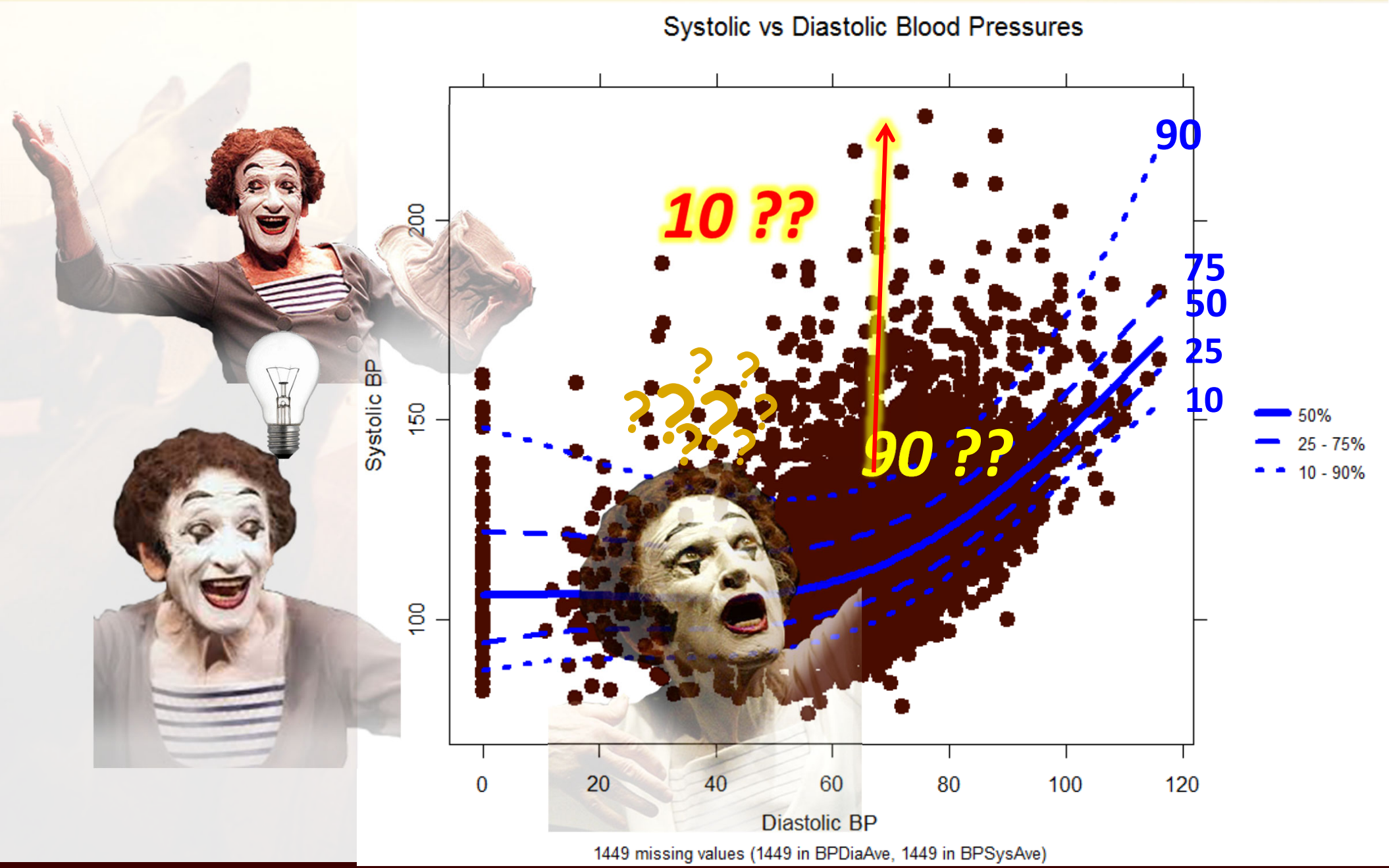
age	gender
9	female
9	female
9	female
10	female
11	female
11	female
11	female
11	female
11	female
11	female
11	female
11	female
11	female
11	female
11	female
12	female
12	female
12	female
12	female
12	female
12	female
12	female

Transparency ...

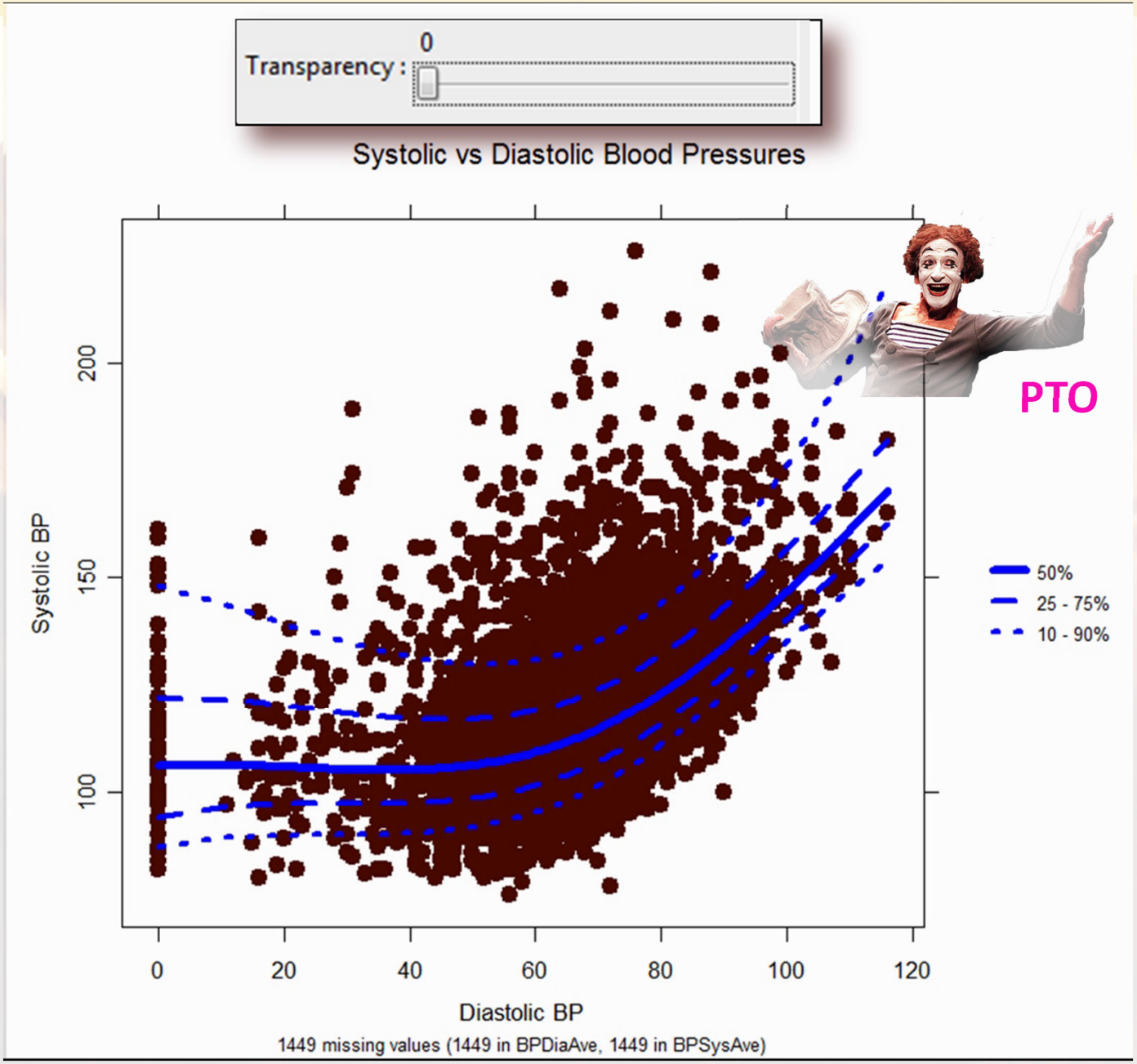
Blood pressures for 10,000 people



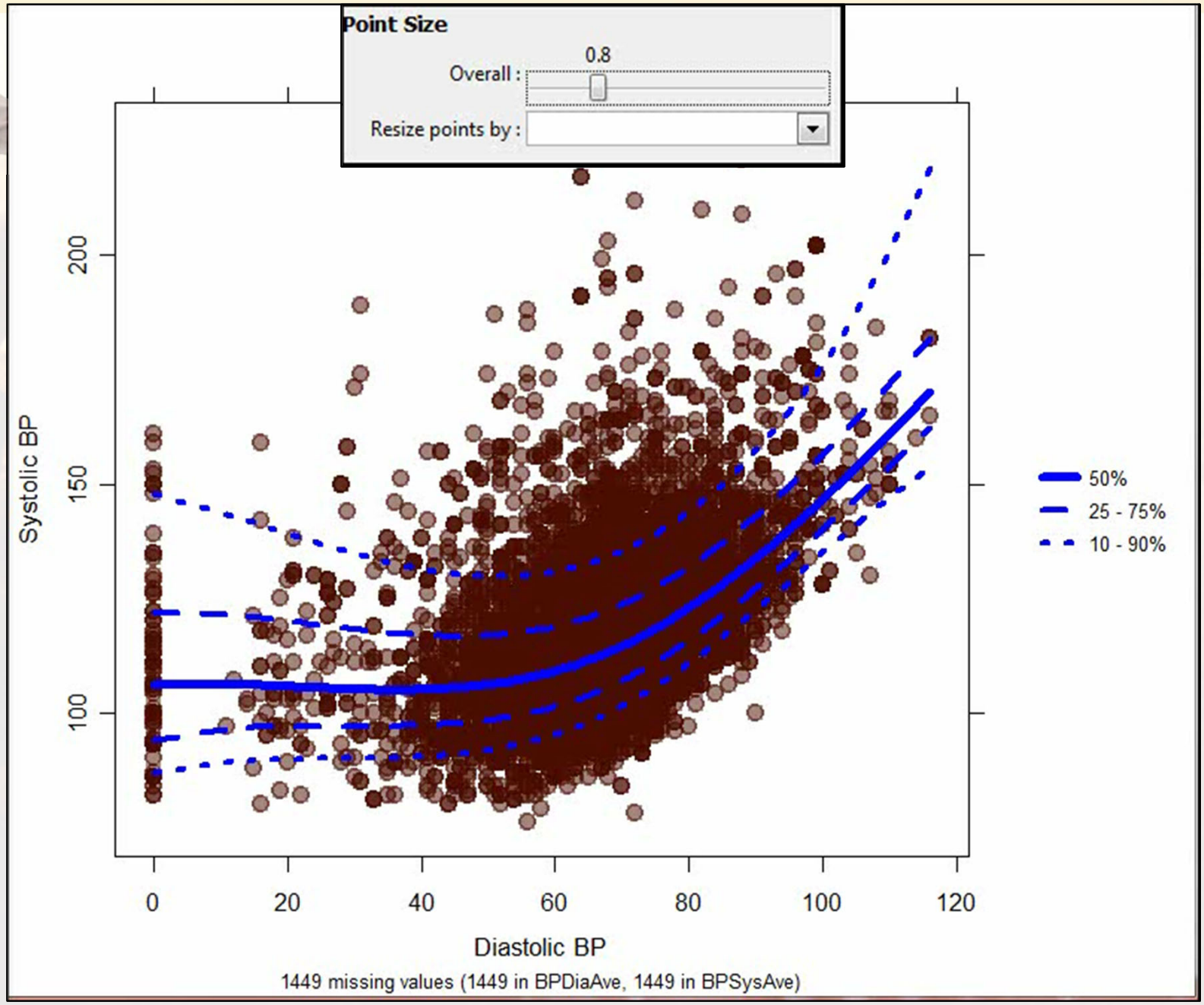
Blood Pressures for 10,000 people



Transparency

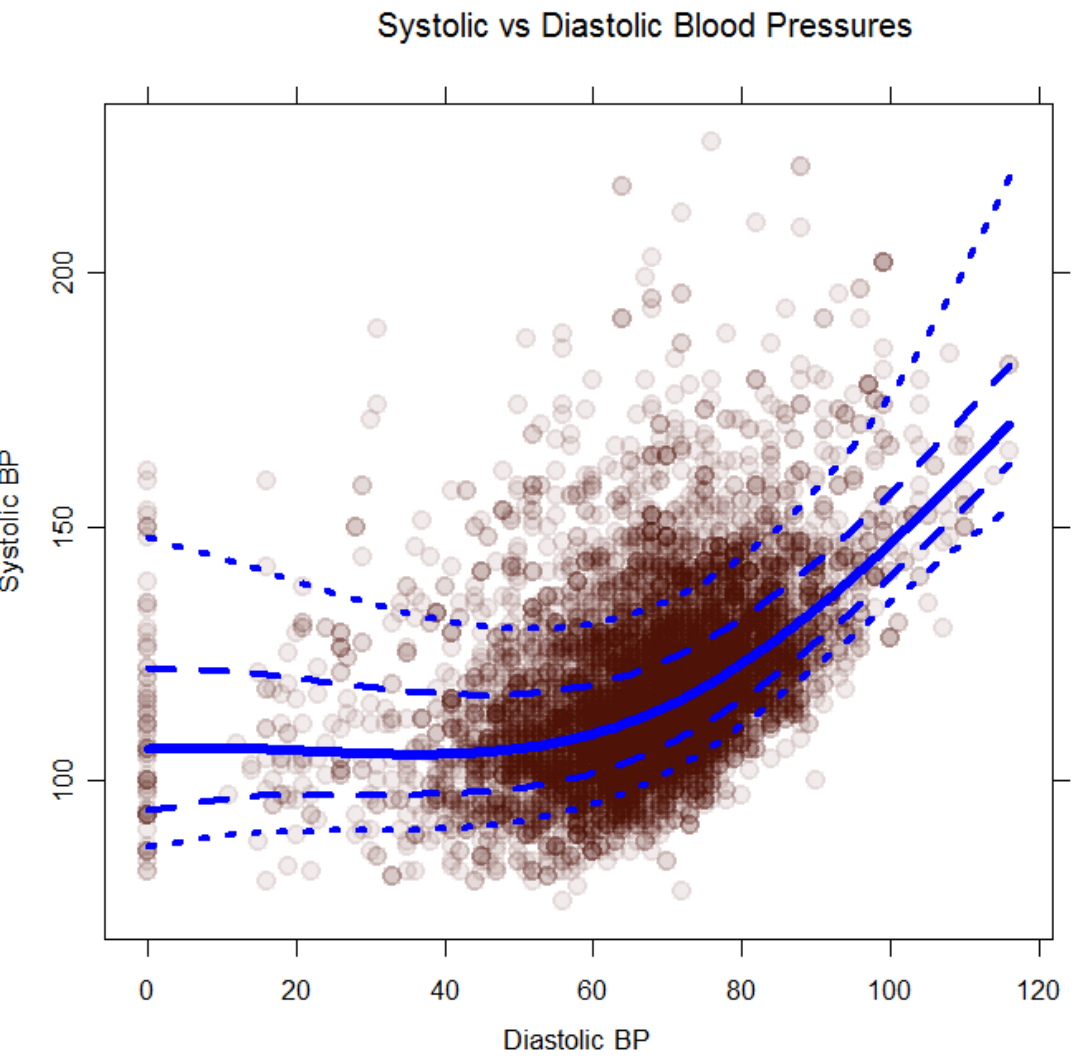


Reducing Point Size

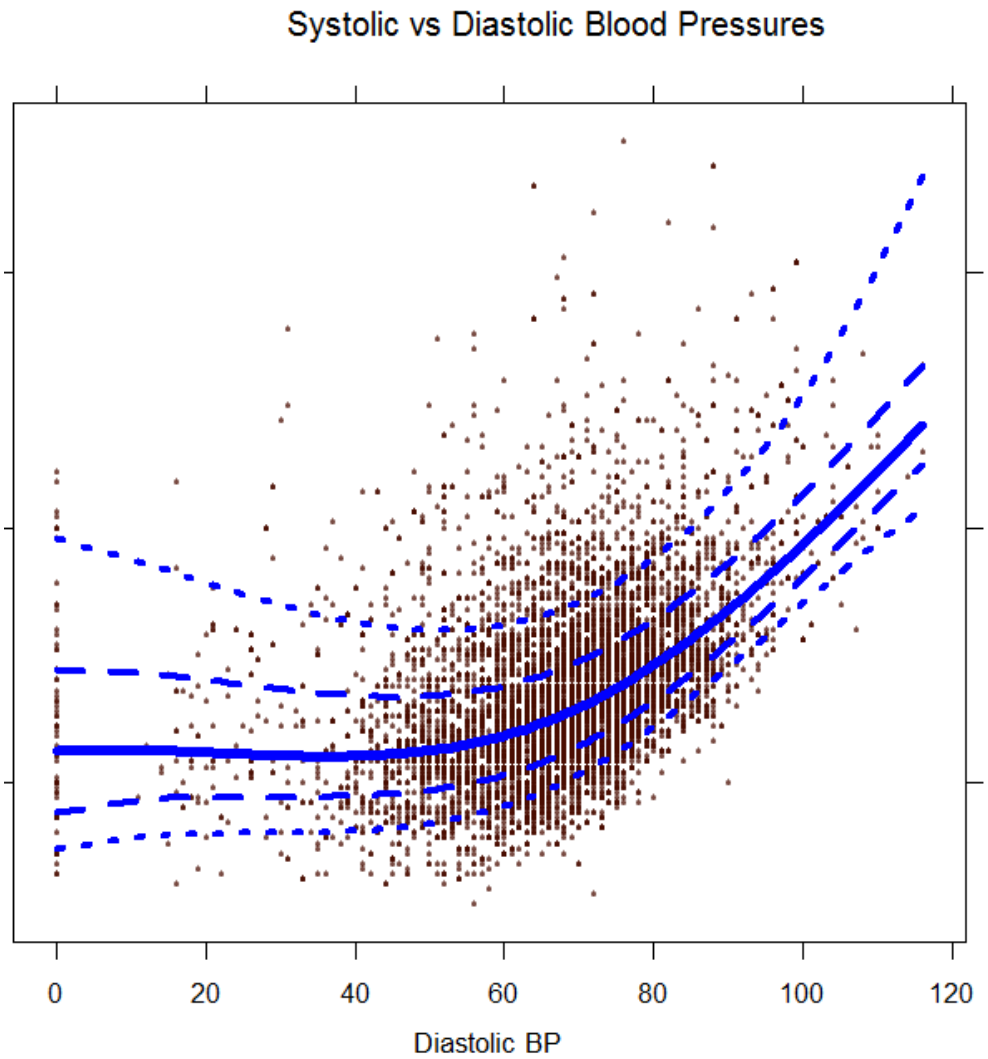


Emphasizing …

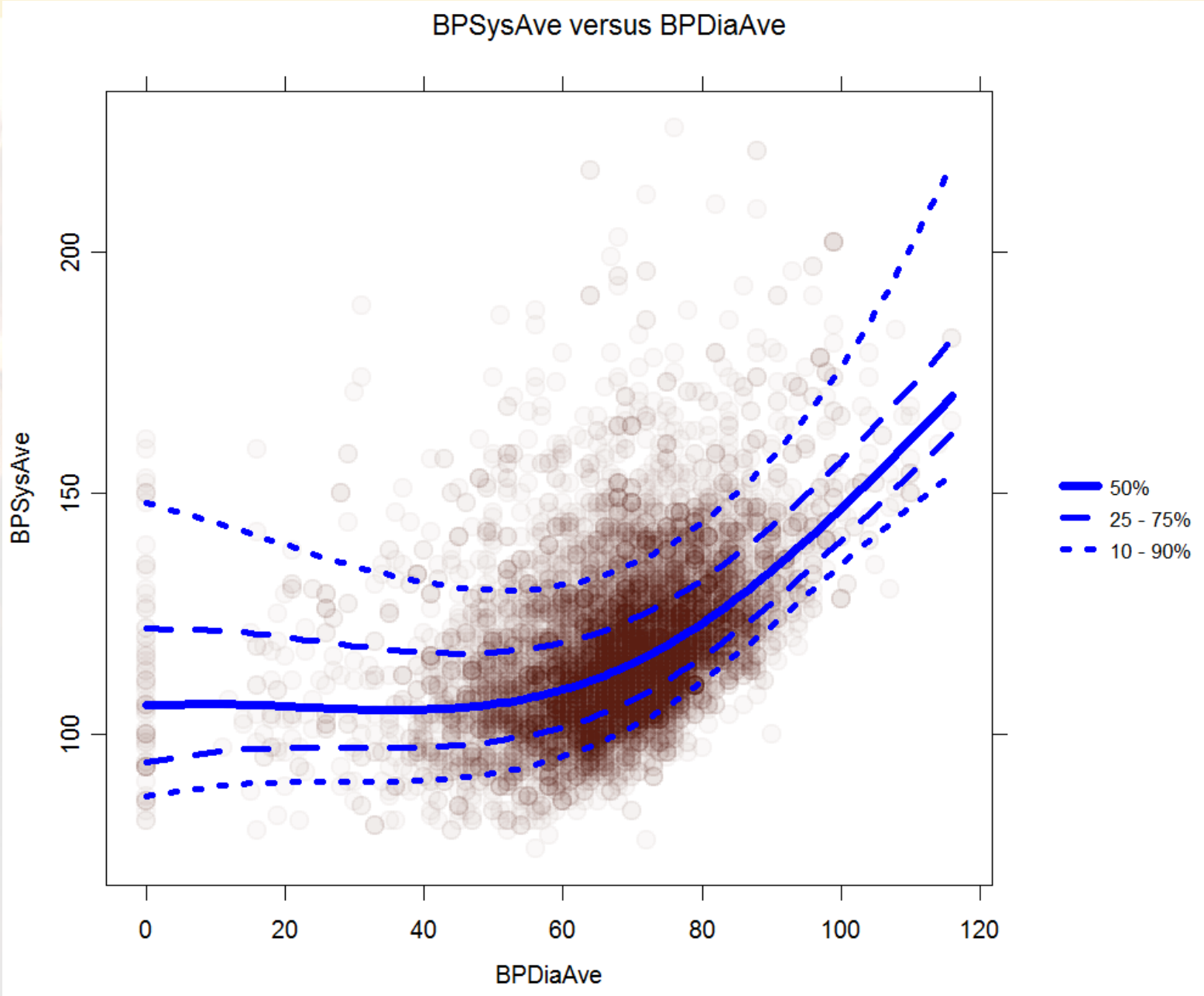
Density



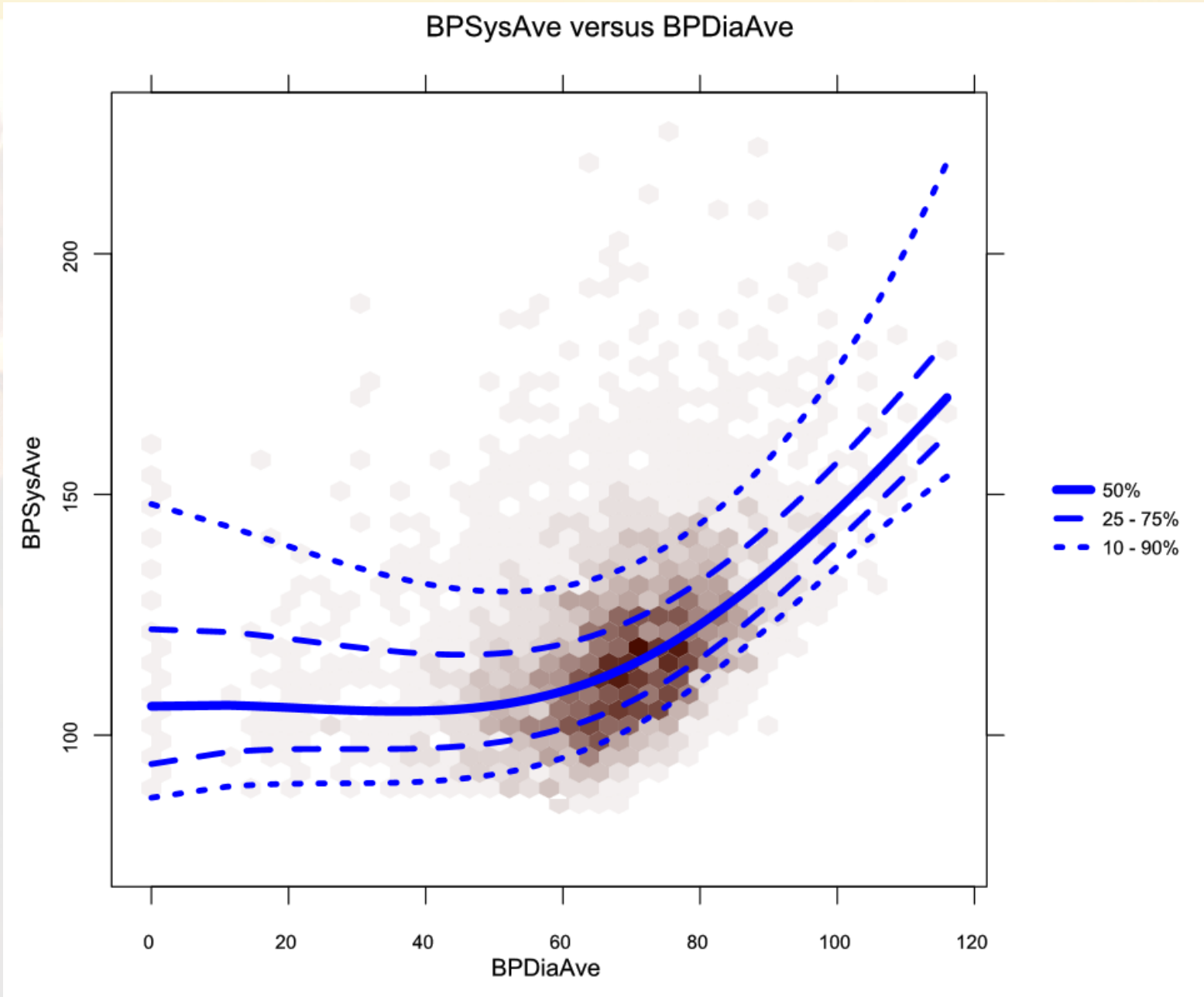
Discreteness



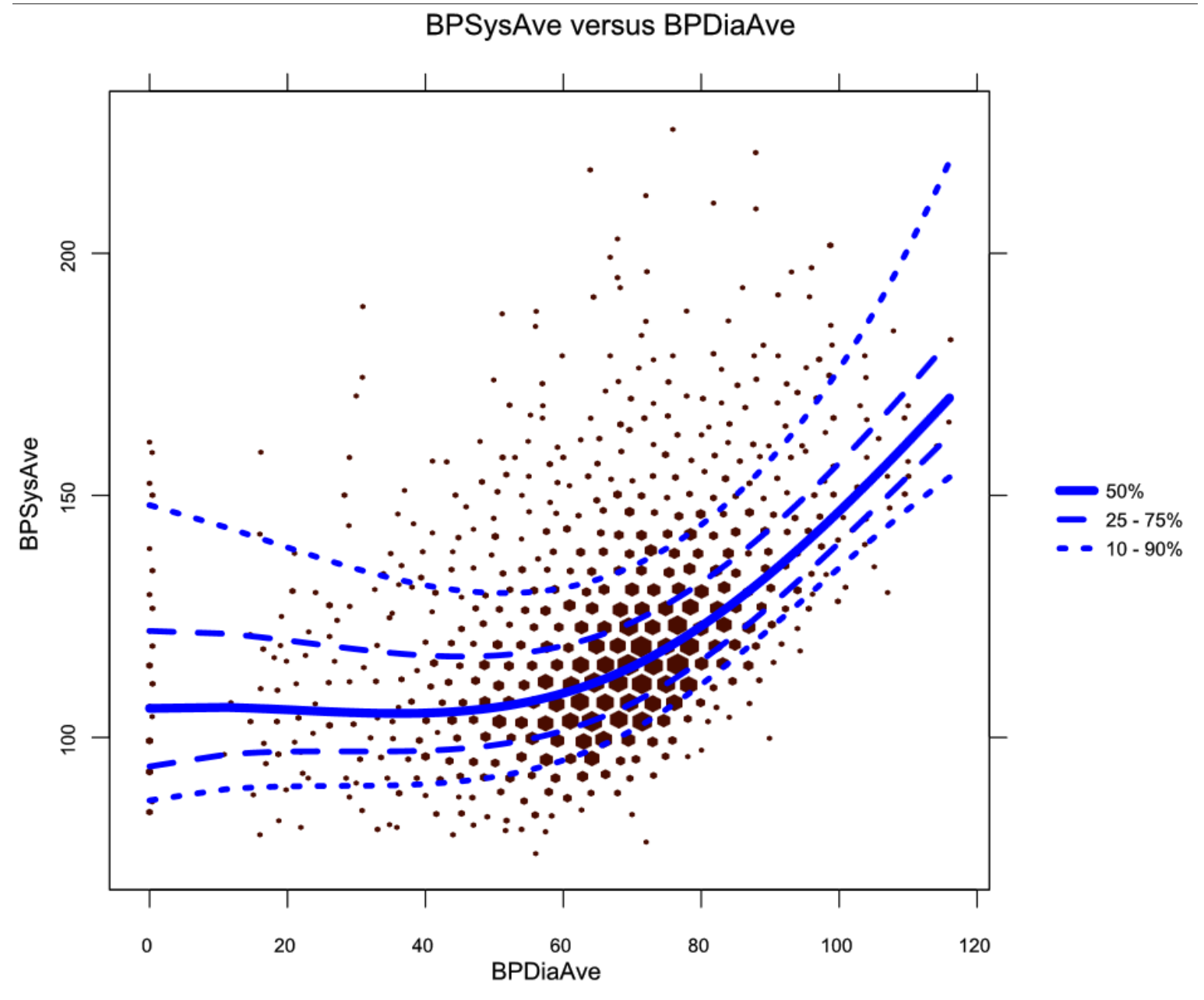
Scatter plot with transparency

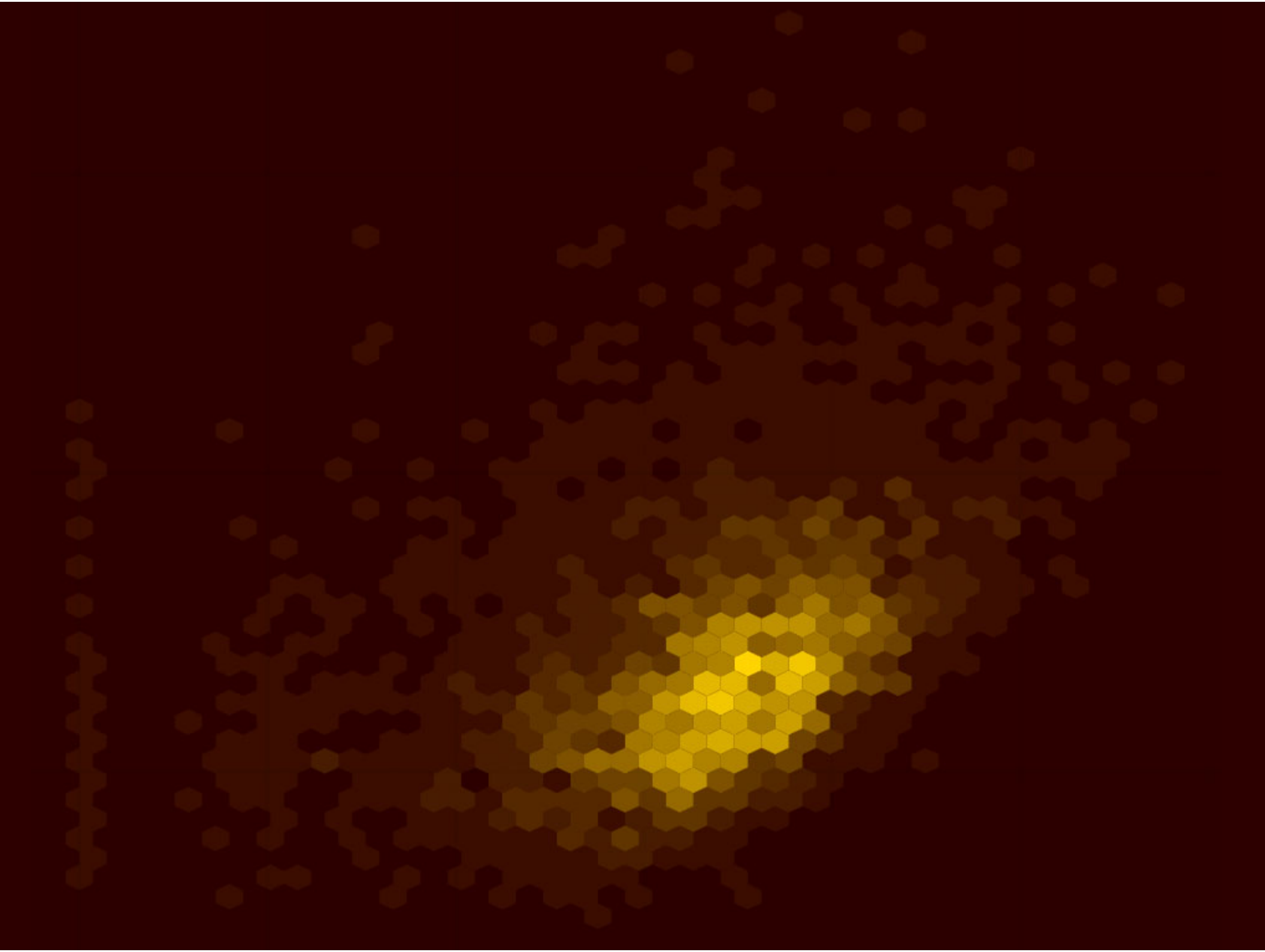


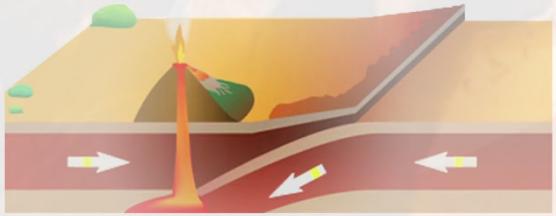
"Big data" version … *Hexbin* (*alpha*)



"Big data" version … *Hexbin* (*size*)

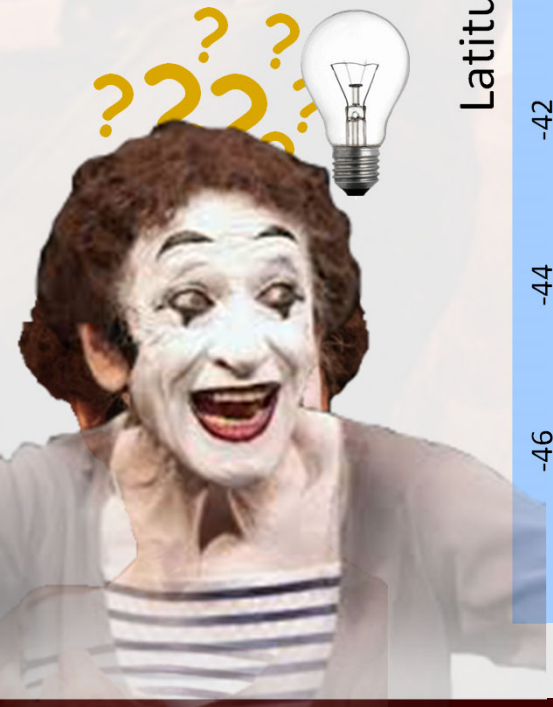


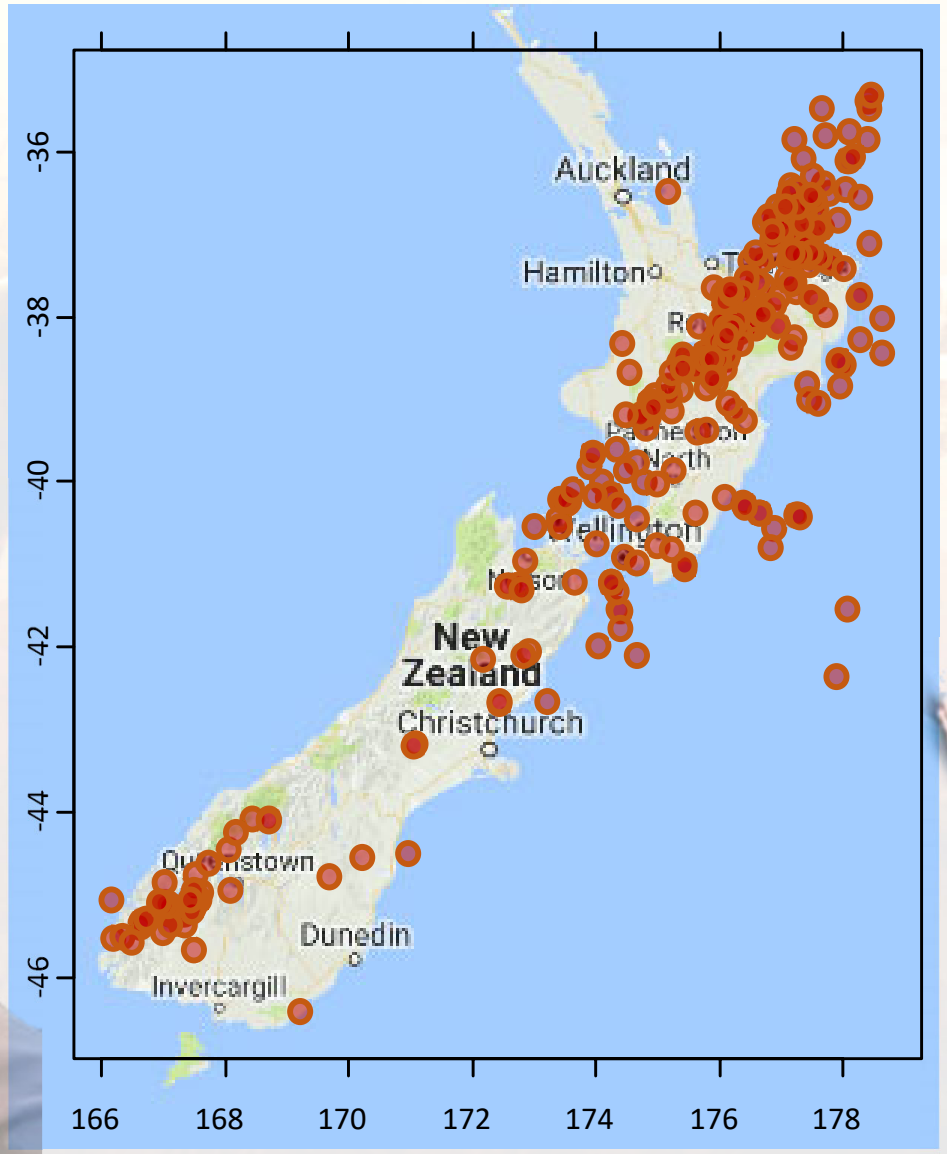




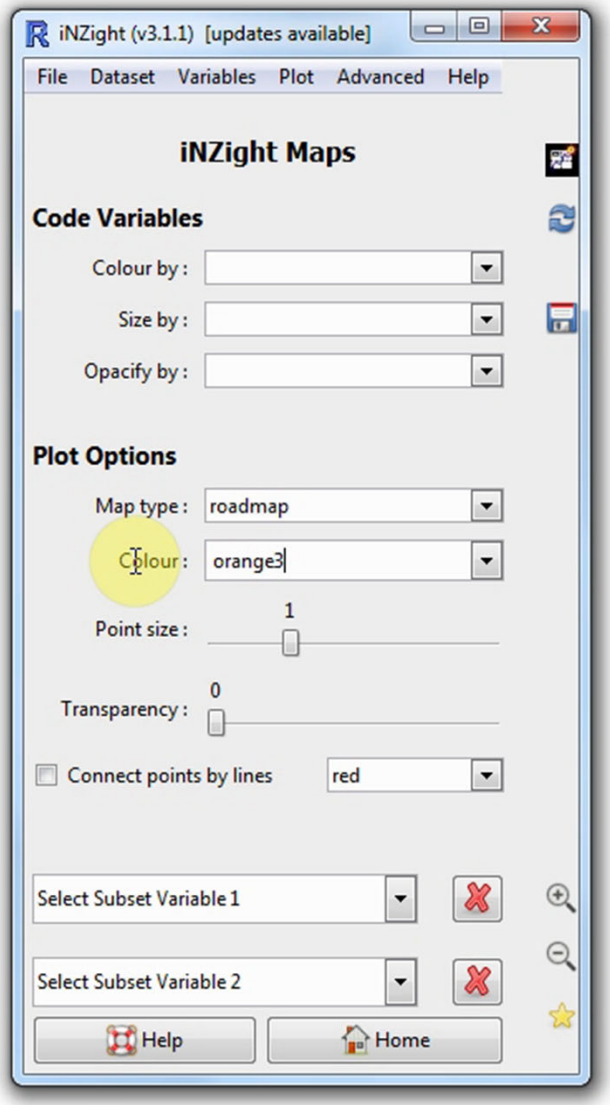
Earthquakes …

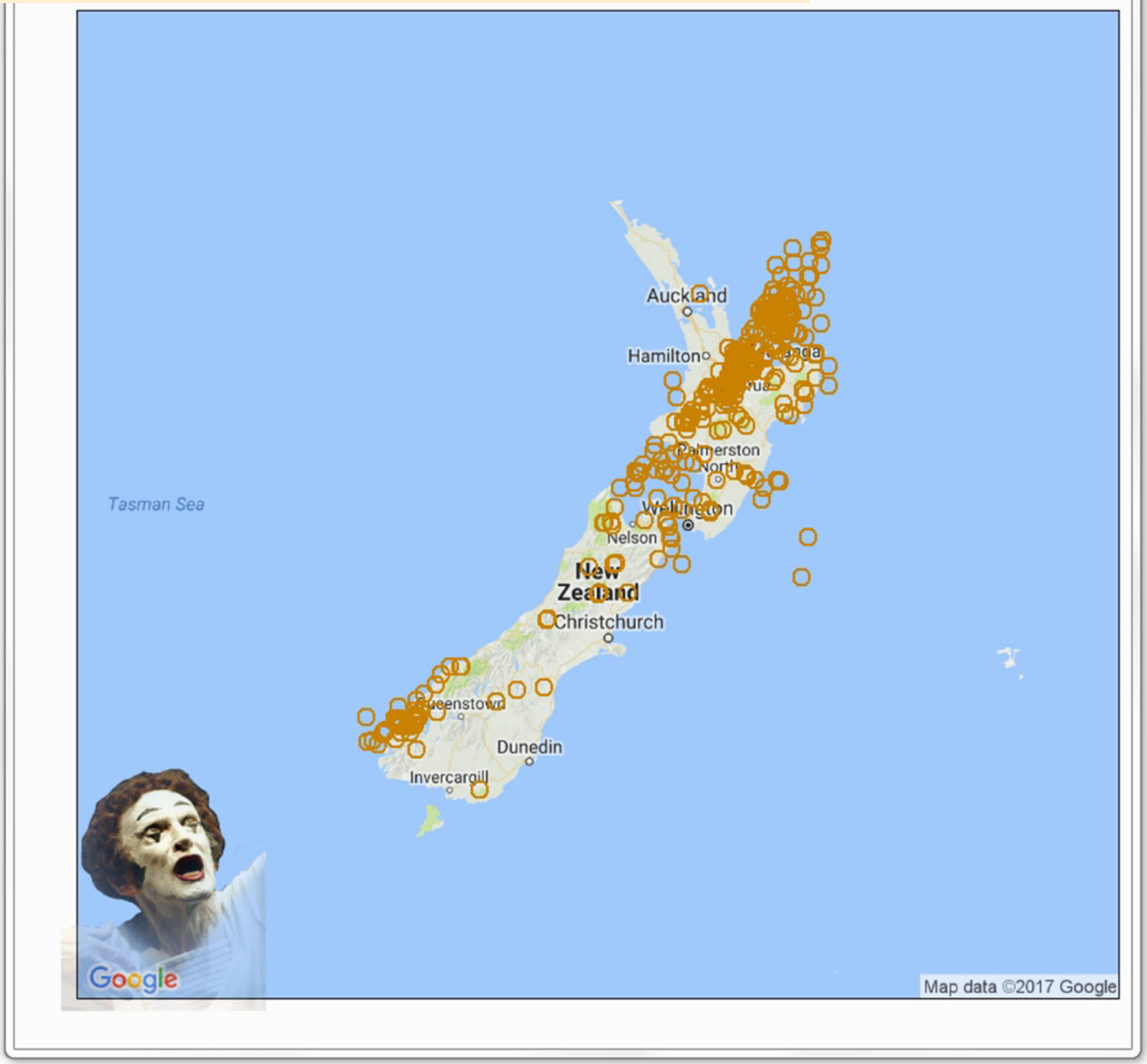
New Zealand Earthquakes (in 2000)





Locations of Earthquakes

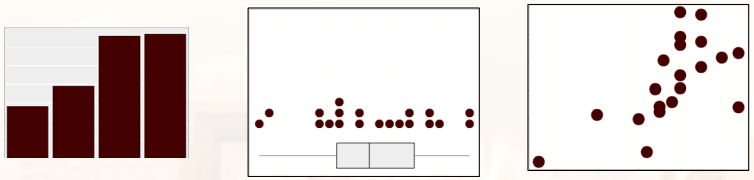




Today's cooking demonstration

Raw Ingredients

- Bar charts
- Dot plots
- Scatter plots

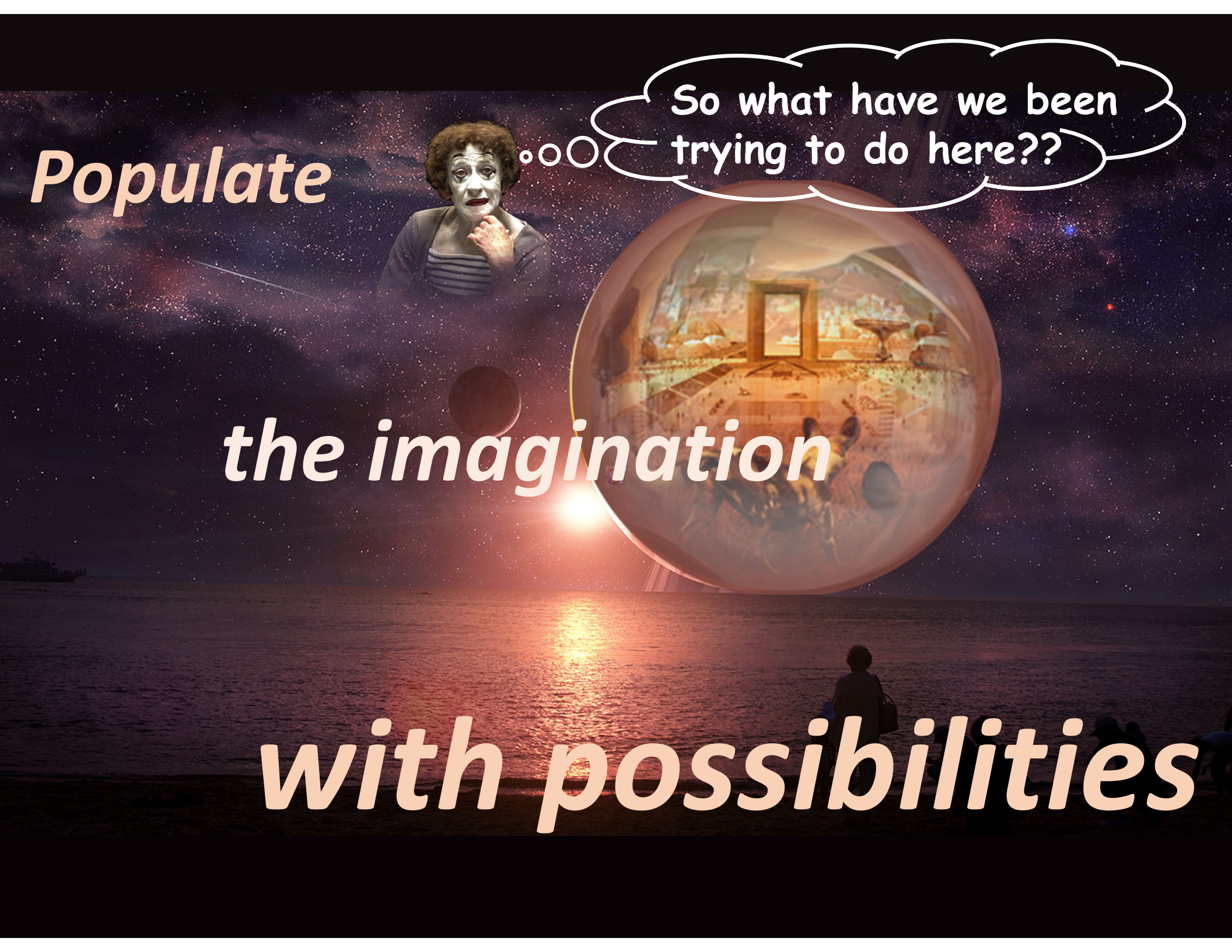


Added Spices

- Colouring
- Sizing
- Transparency
- Subsetting
- Identification
- Bait & switch

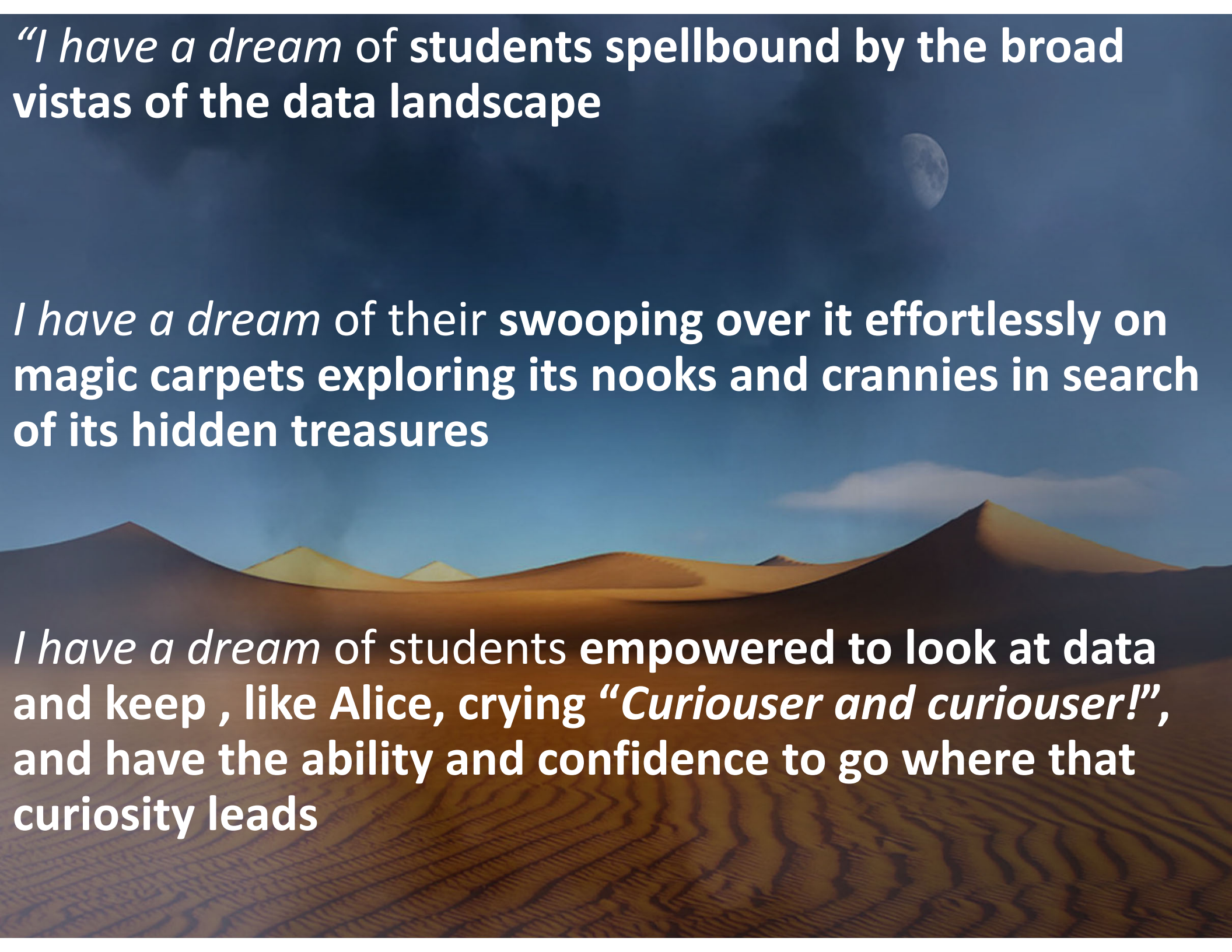
Magic Super Spice

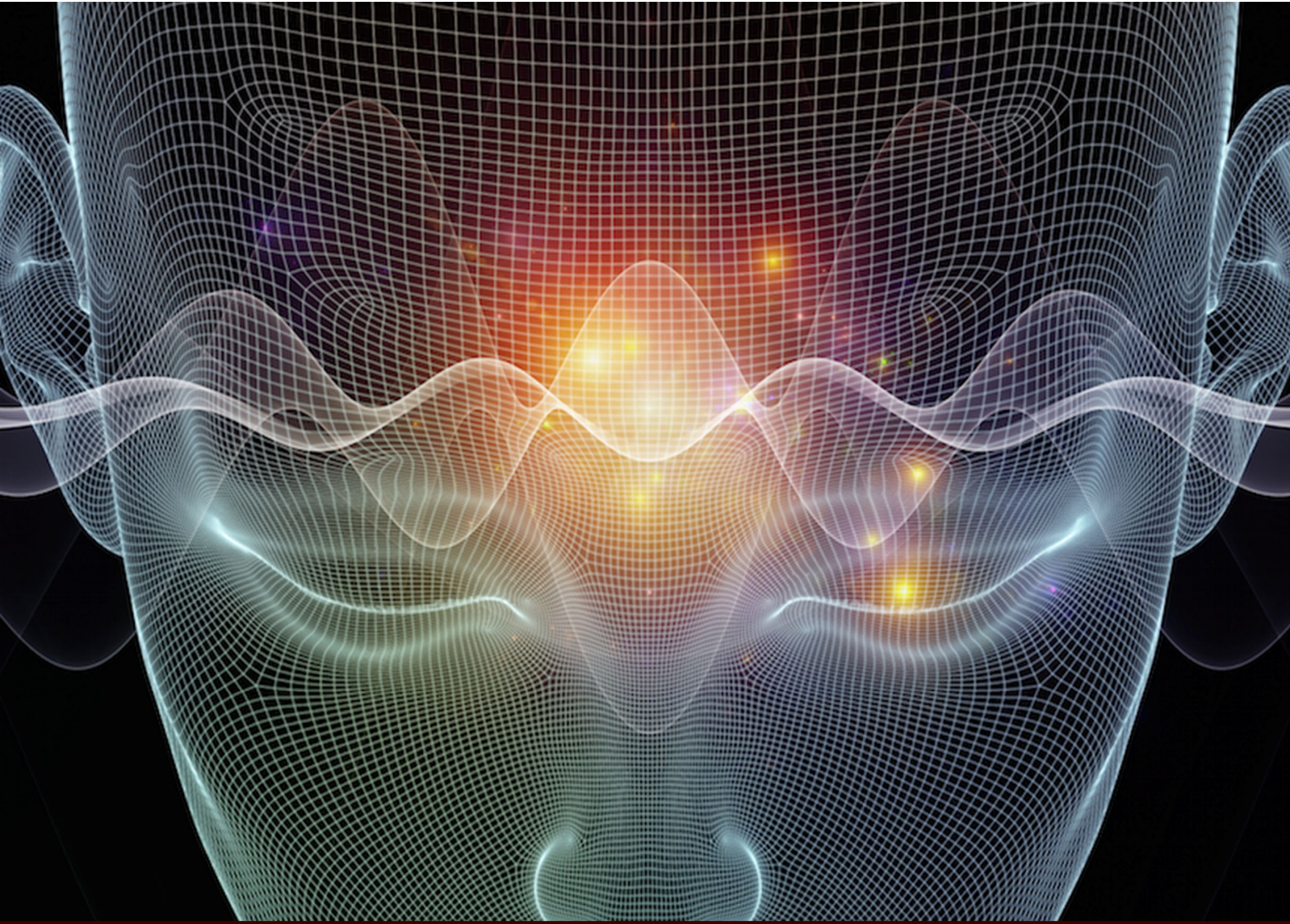
- Stepping


So what have we been trying to do here??
Populate
the imagination
with possibilities


Distribution of Qualification
Proportion (%)
none
school
vocational
degree
Qualification
Hours Worked
Hours
Income versus Hours
Income
Hours


“I too have a dream …


"I have a dream of **students spellbound by the broad vistas of the data landscape**
I have a dream of their **swooping over it effortlessly on magic carpets exploring its nooks and crannies in search of its hidden treasures**
I have a dream of students **empowered to look at data and keep , like Alice, crying "*Curiouser and curiouser!*", and have the ability and confidence to go where that curiosity leads**




Please Rise
for the official Anthem
of Statistics Teachers Day
Slap, Slap, Clap
We will Rock You … / We will Plot You …


We Will Rock You!