



(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 Health Warning***

Chris Wild
University of Auckland





Crazy Diamond Productions

Pastiche Productions

Rank Amateur Films

Powered by 200 Mb of PowerPoint

& graphics from



A dark, moody photograph of a man's face, partially obscured by shadow, with a dramatic, cloudy sky in the background.

Darkness and
ignorance
reign ...

RecoShan

RecoShan



517 422

633

517 422

294

210	606423 996	960754	210	294	606423 996	960754
	503	503563	614	503	503563	294
	523	793	580	581 2363	793	580
6335	69828	75460	155 135	69828	75460	614
	684	721	300	684	721	155 135
	448	523	6365	538	448	300
	804	573	8680	804	573	581 2363
470	657	736	6205	636	736	705
	900754	422	59124	470	8080	
	20701	490	109	933	6205	
	782	490	401	294 900754	866	
	468	821	316	782	36859424	
992	277	503	602548	636	490	294
	523	793	523181	782	377	116
6335	69828	75460	155 135	621	57964	538
	684	721	300	621	672	621
	448	523181	581 2363	621	672	254
470	657	736	8680	621	933	116
	900754	422	377	6205	494	
	20701	490	210	911	316705	
	782	490	866	503	503563	
202	468	821	59124	523	937	294
	992	277	36859424	277	580	614
210	503	316	69828	294	155 135	116
	523	793	75460	736	300	581 2363
6335	69828	75460	197	901	8080	
	684	721	197	782	6205	
	448	52302548	52302548	992	866	
	804	573	155 135	468	36859424	
470	657	736	8680	821	57964	538
	900754	422	6205	277	227 705	621
	20701	490	36859424	277	672	294

DELL

T22 632

821

57964

499
6
621

277

227

116

“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



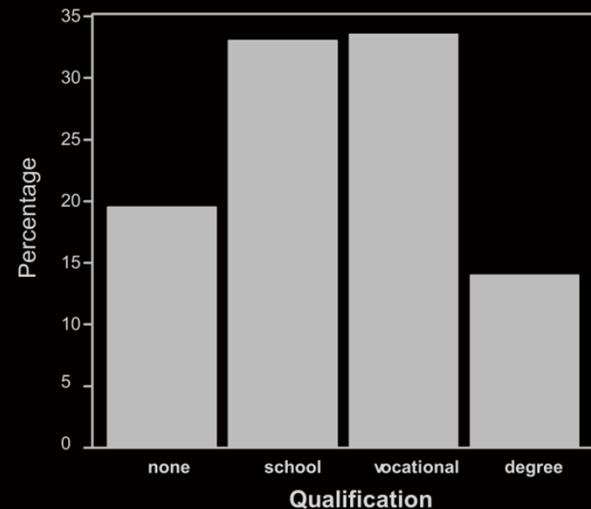
How Gilding Familiar Lilies ...

can illuminate our World

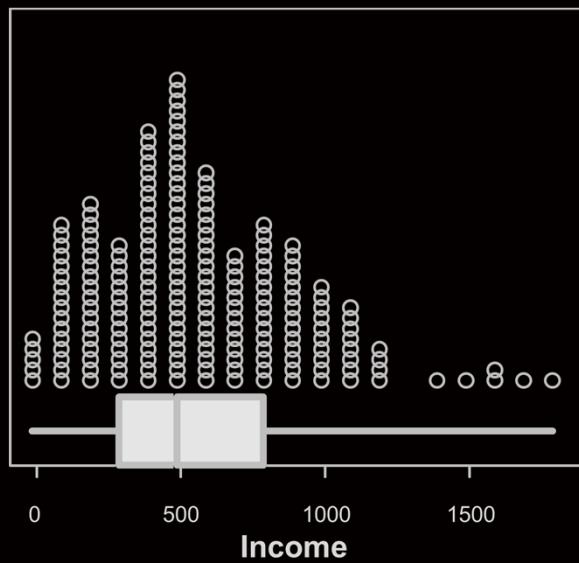




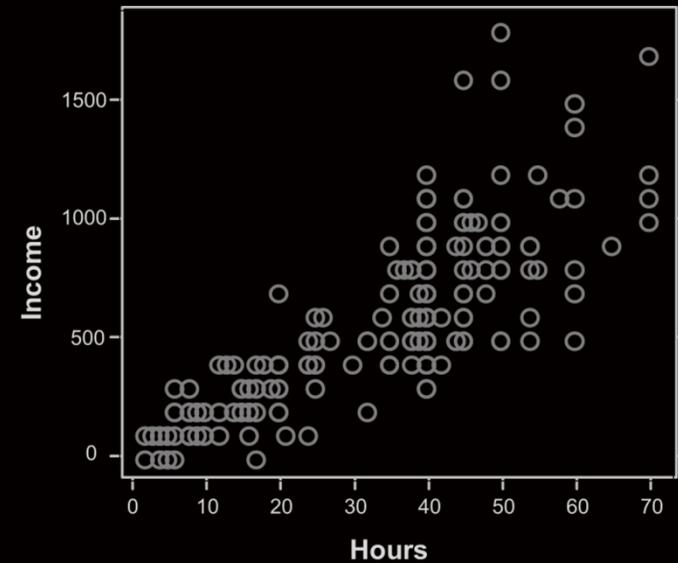
What are these familiar lilies ? ...



Bar chart



Dot plot

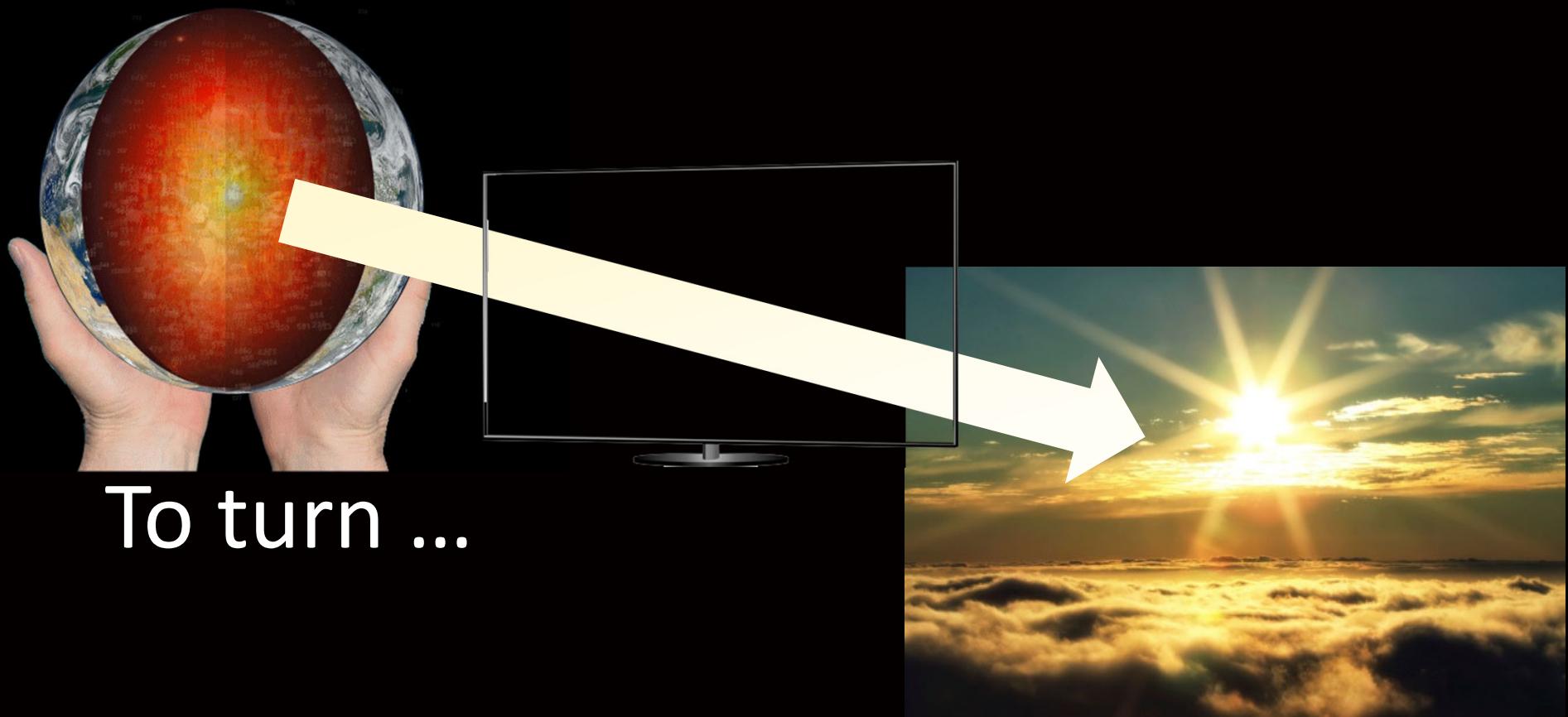


Scatter plot



What are these familiar lilies ? ...

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



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 like
- Motion step on moving
- Identification & brushing
- Transparency
- Bait & Switch



Cooking with spices ...

This talk ...

Less ...



More ...



Why ???

Holi: Indian festival of Colour

Ris Wild, 2017 Statistics Teachers' Day

*What is the single best thing
we can do for our students?*

A photograph of a person sitting on a beach at sunset, looking up at a large glowing sphere. The sphere reflects a futuristic cityscape with a golden square frame and a central fountain. The background is a dark, star-filled sky.

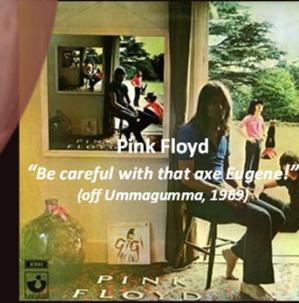
*Populate
their imaginations
with possibilities*

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!



PASSION DRIVEN STATISTICS

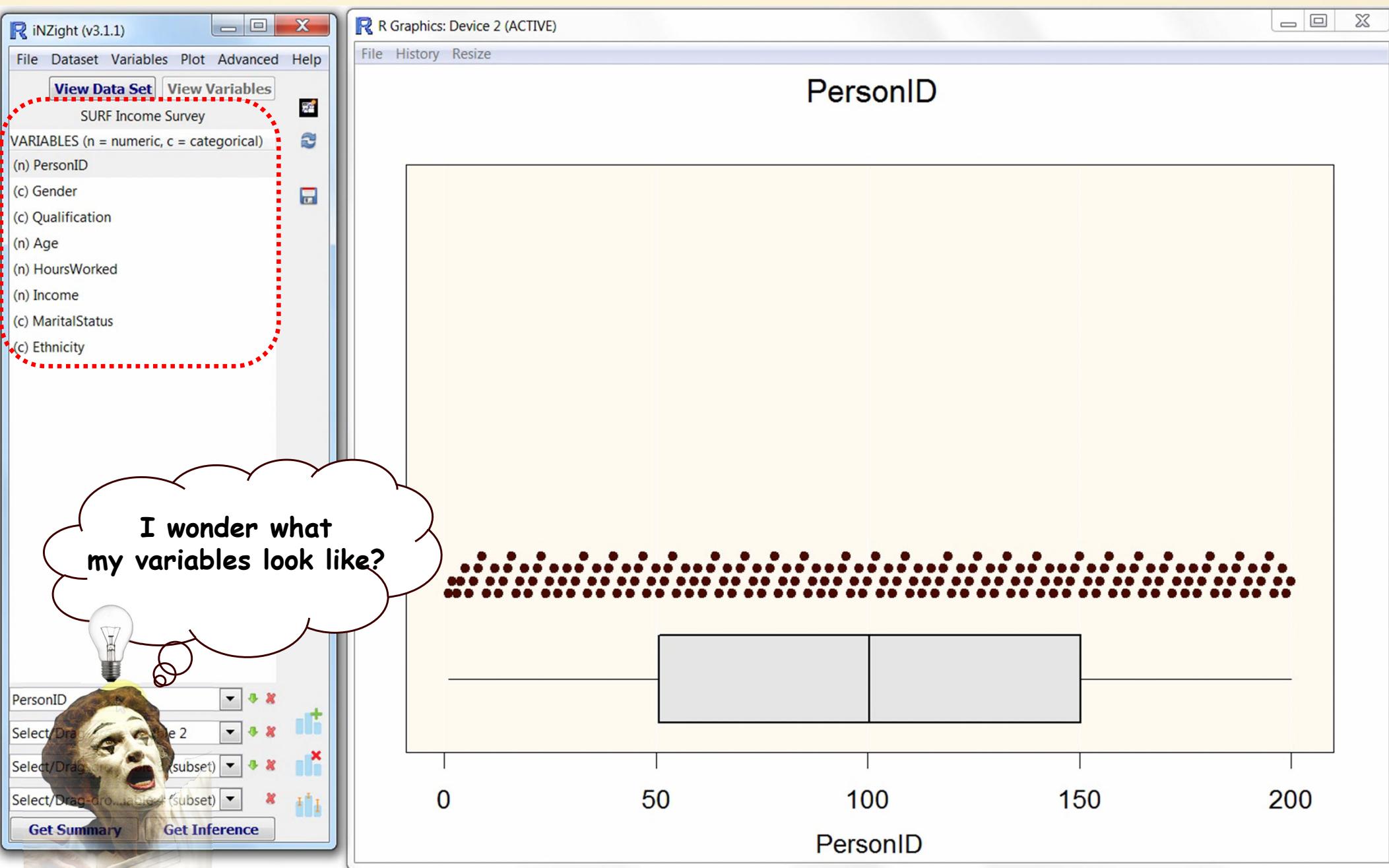
So let's get cooking !!





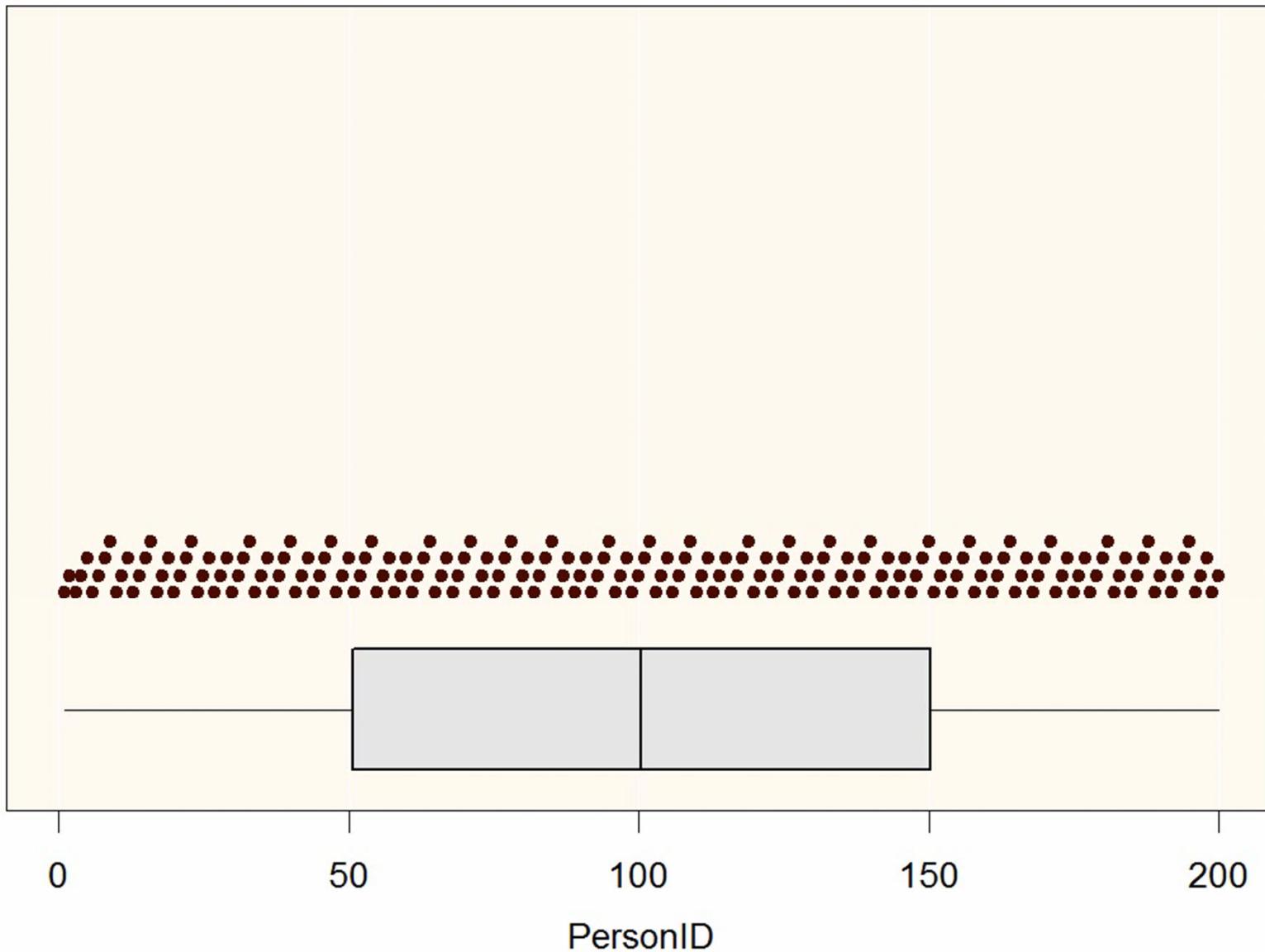
... Stepping through Variables

Stepping through Variables

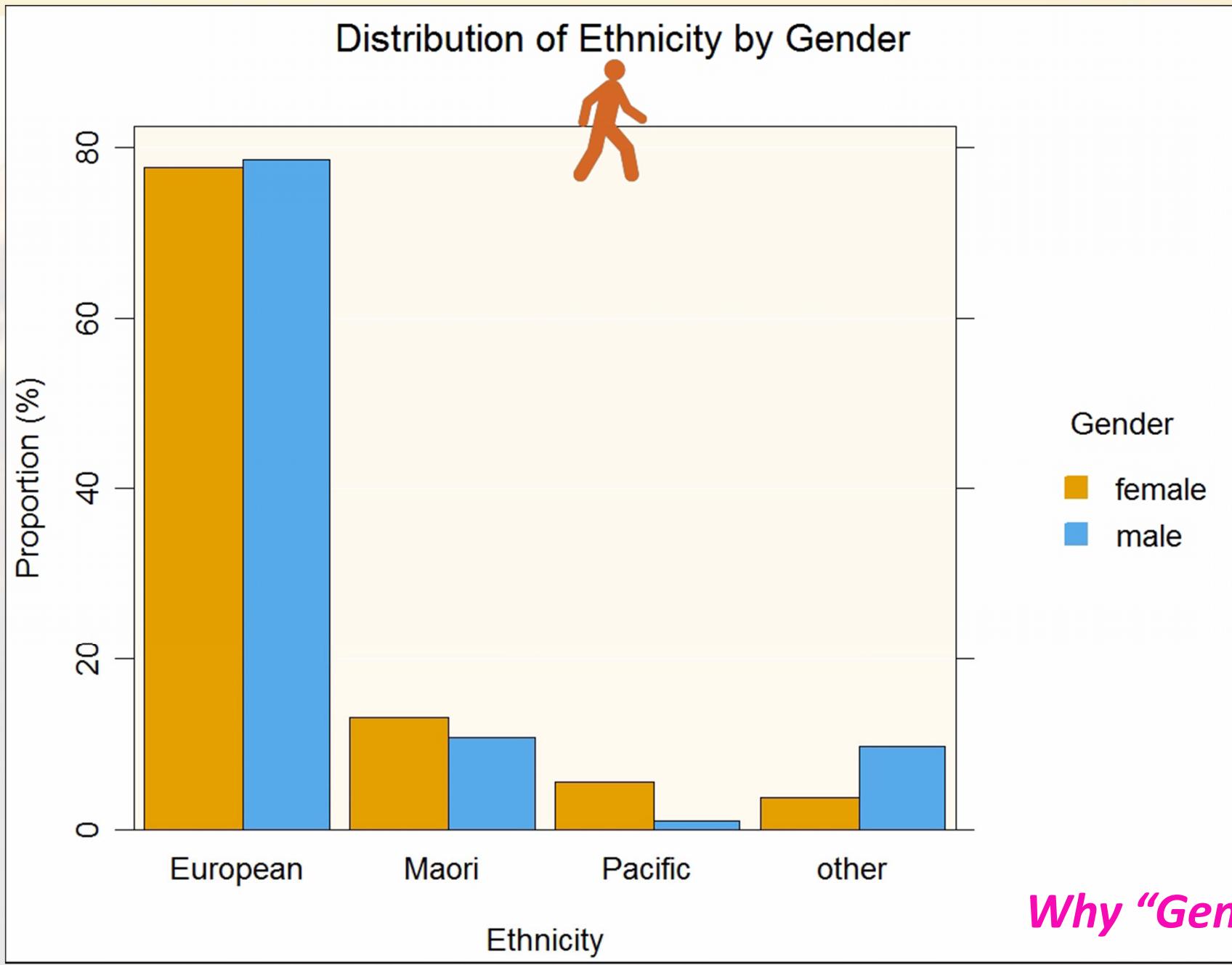


Stepping through Variables

PersonID



Relationships to Gender

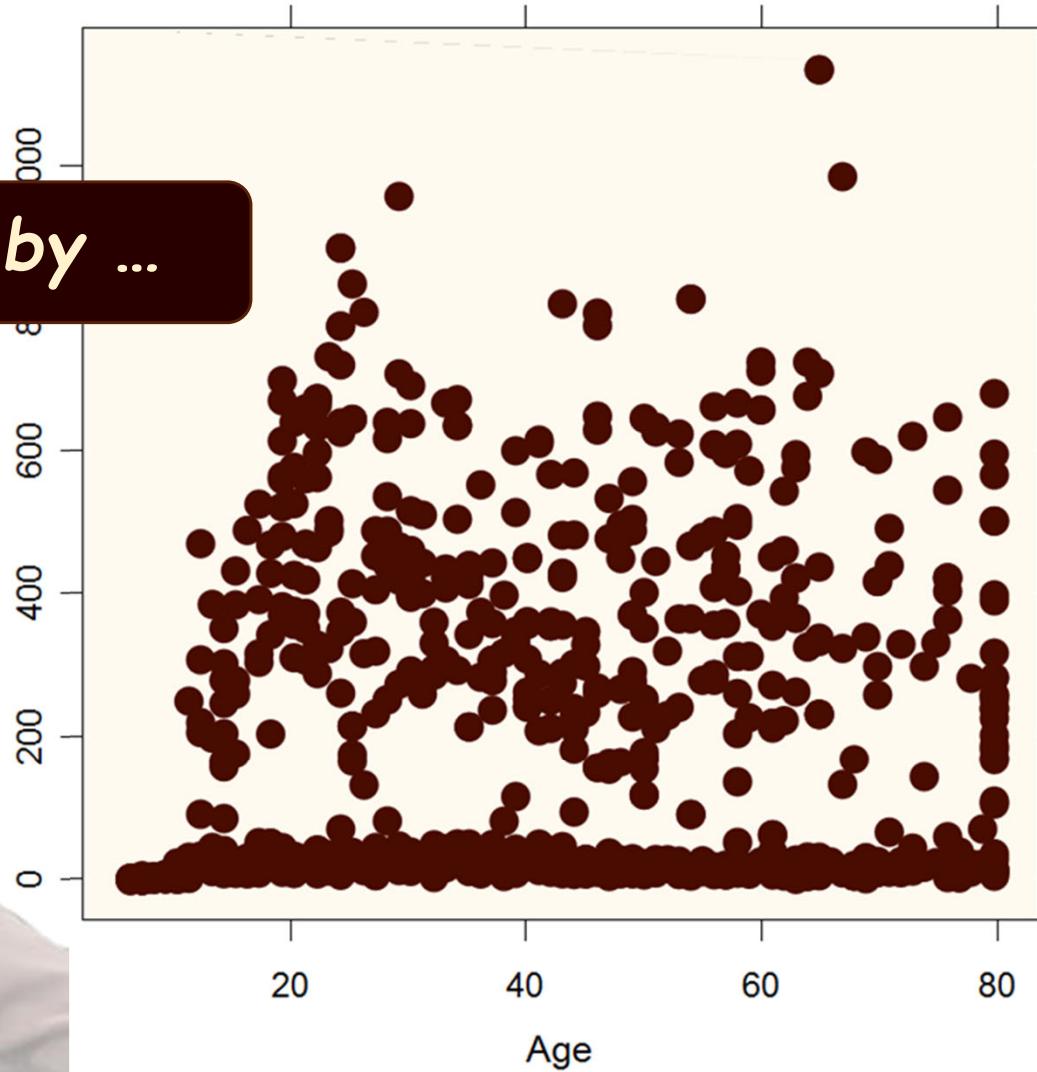




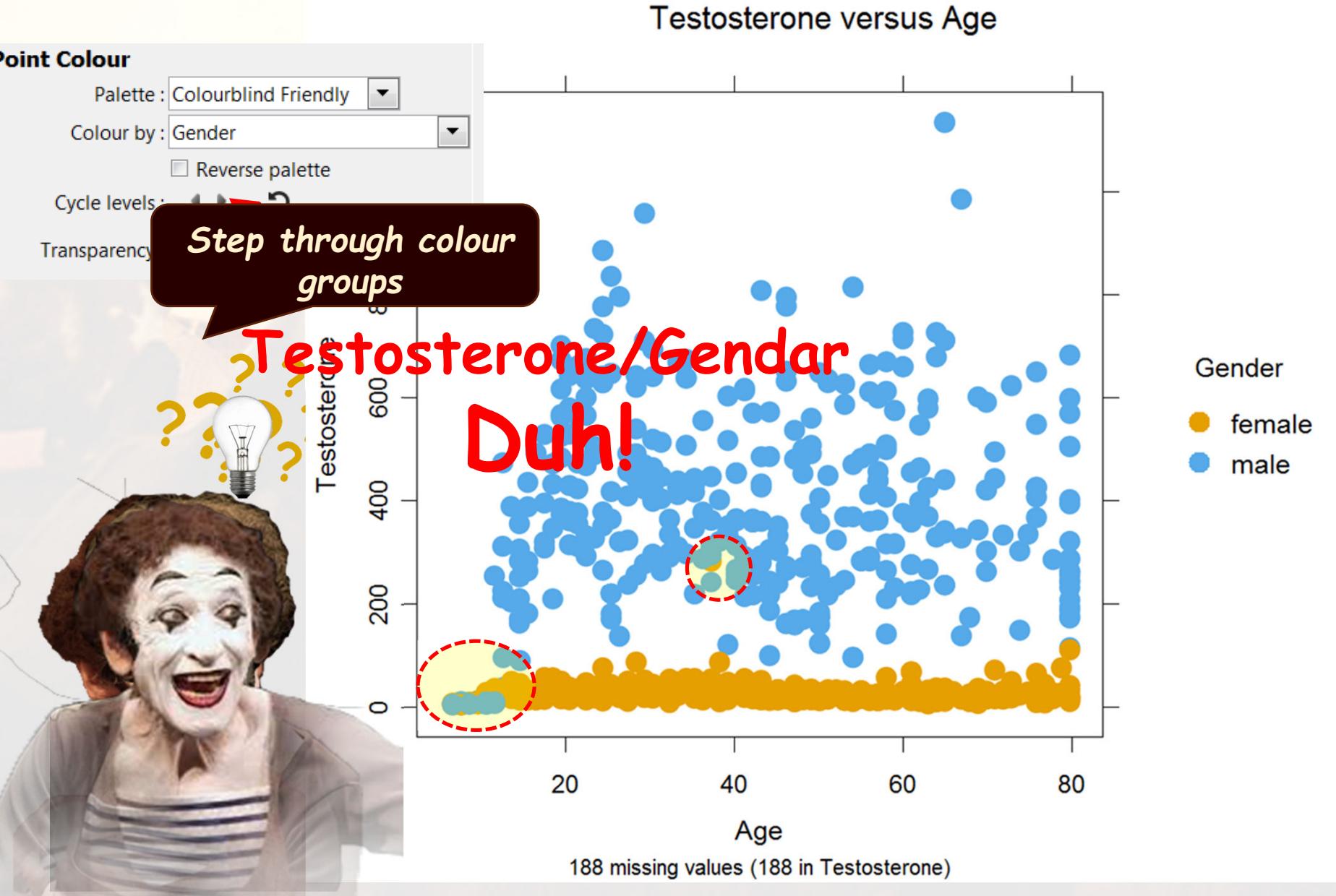
Tasting Colour ...

Testosterone levels by Age

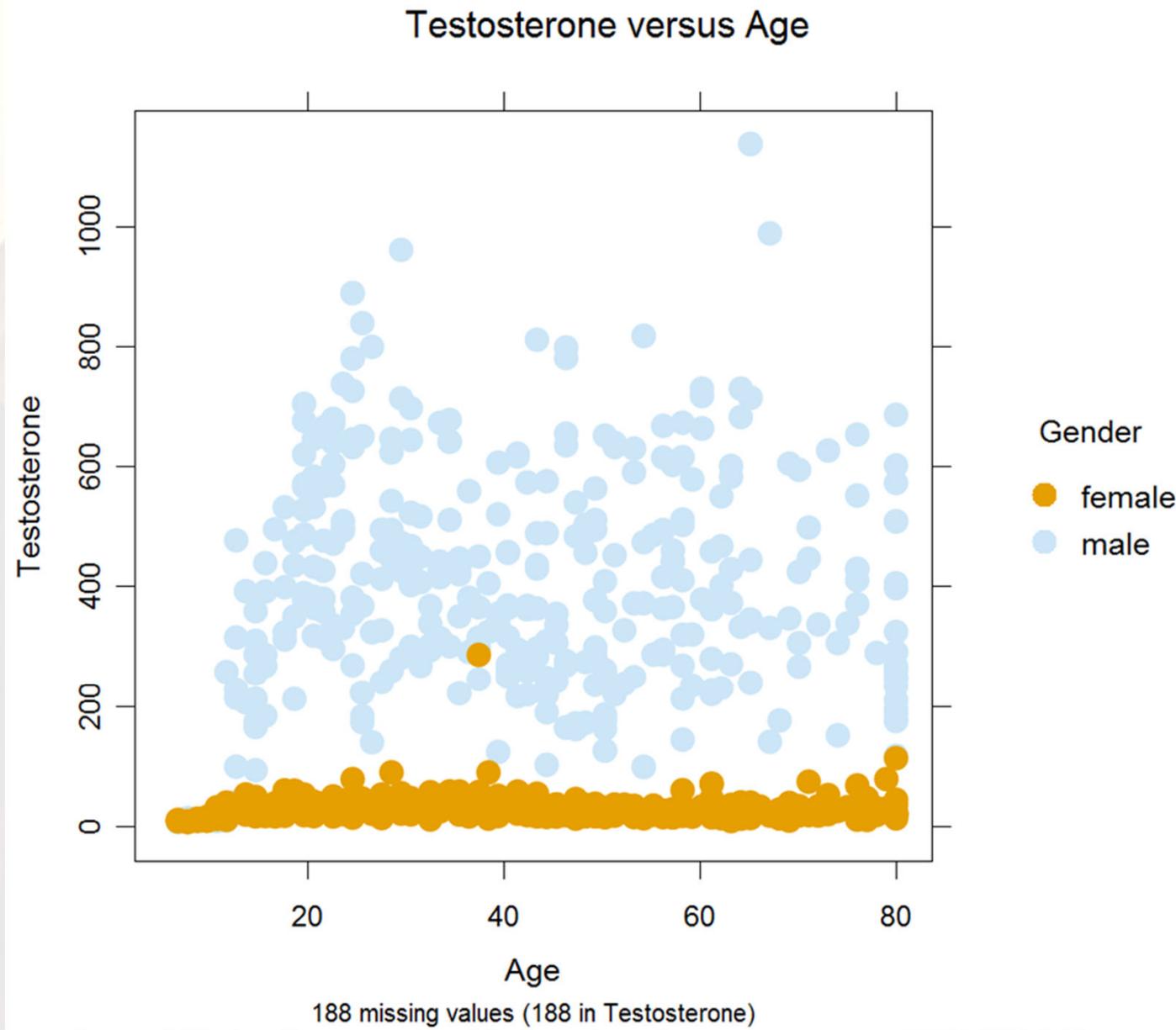
Testosterone versus Age



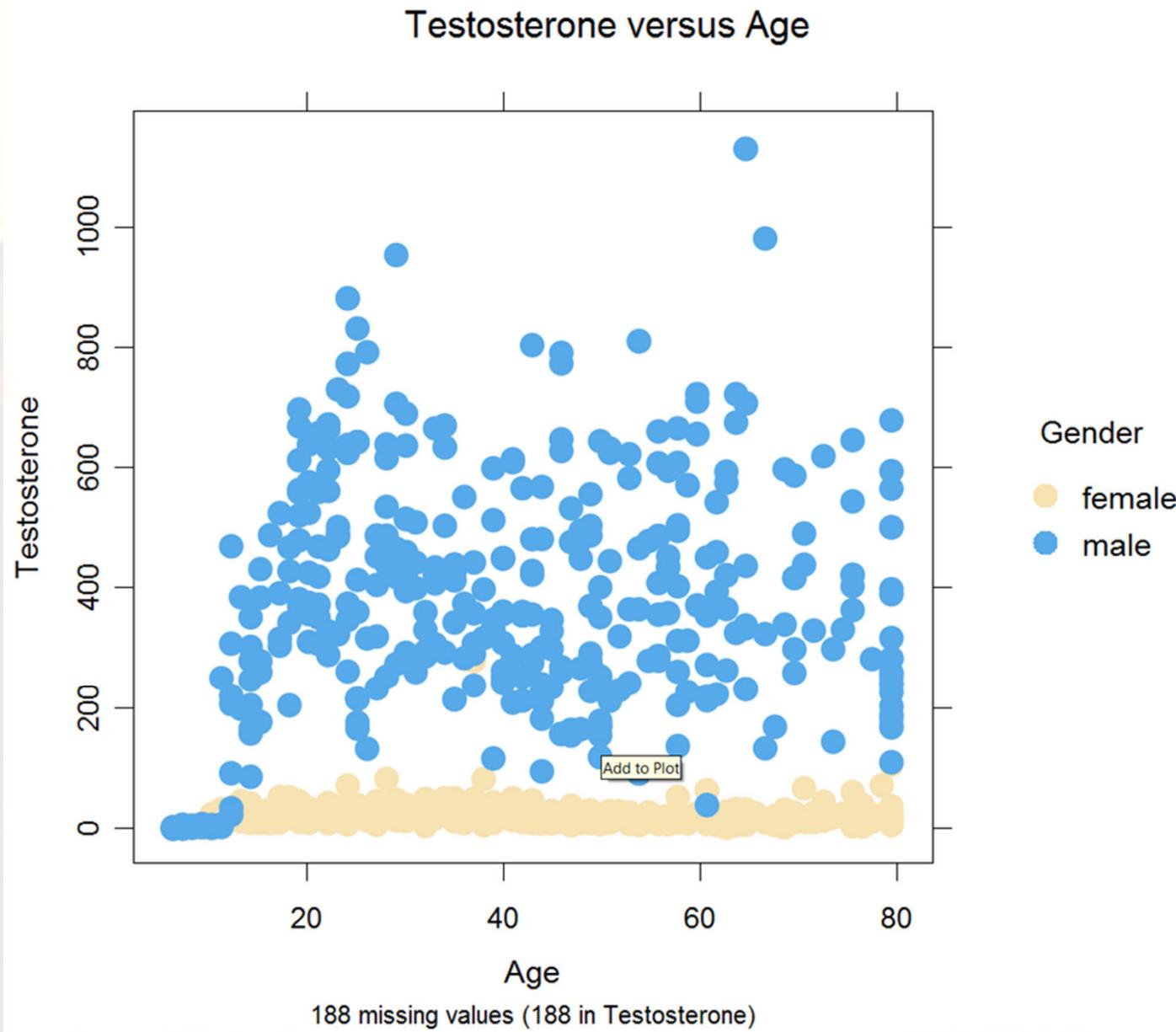
Colour by Gender



Highlighting the females

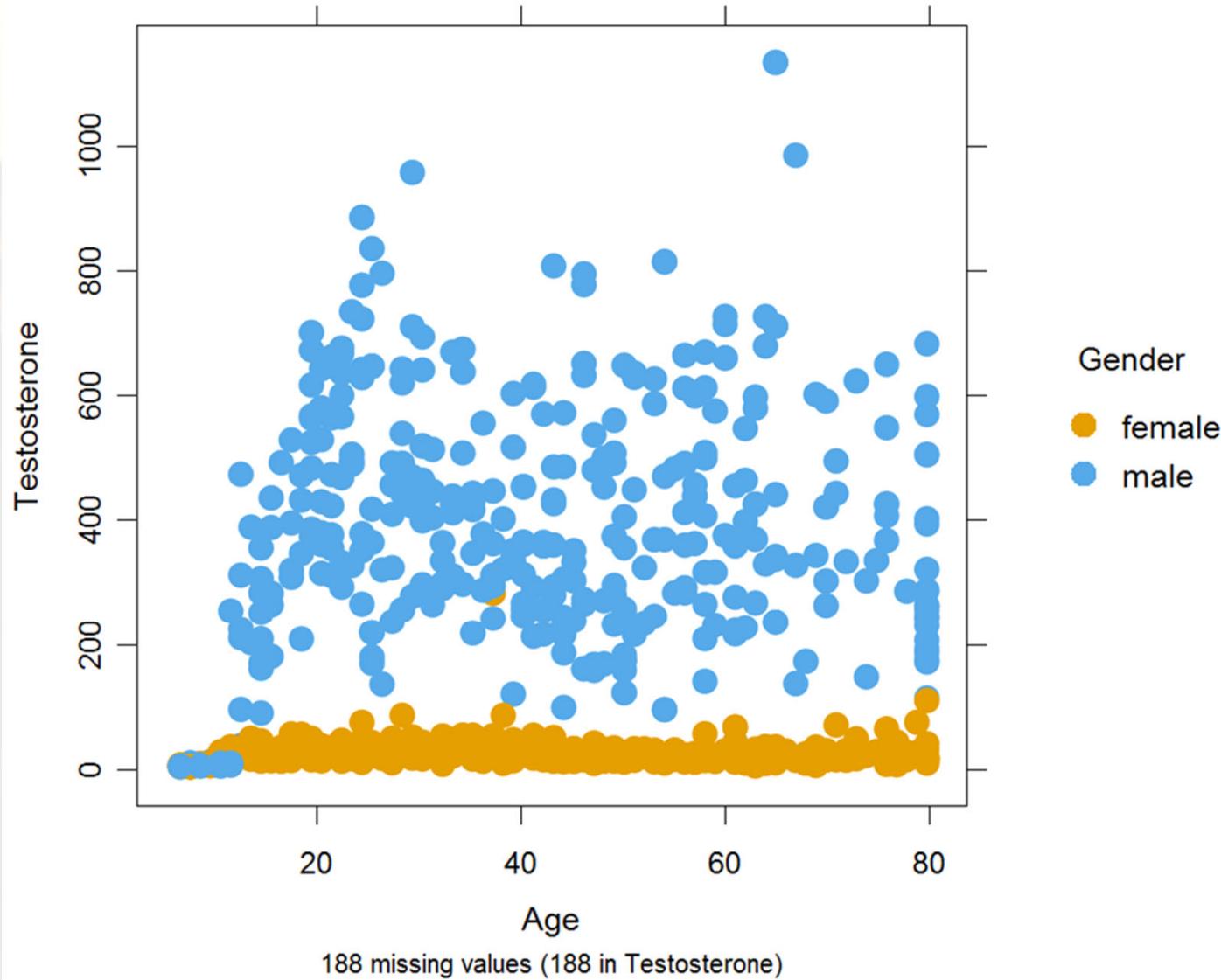


Highlighting the males



Colour by Gender

Testosterone versus Age



Fertility by Region

Colour by ...



???

America

Oceania & Pacific

Europe & Central Asia

Middle East & North Africa

South Asia

Sub-Saharan Africa

-2

0

2

4

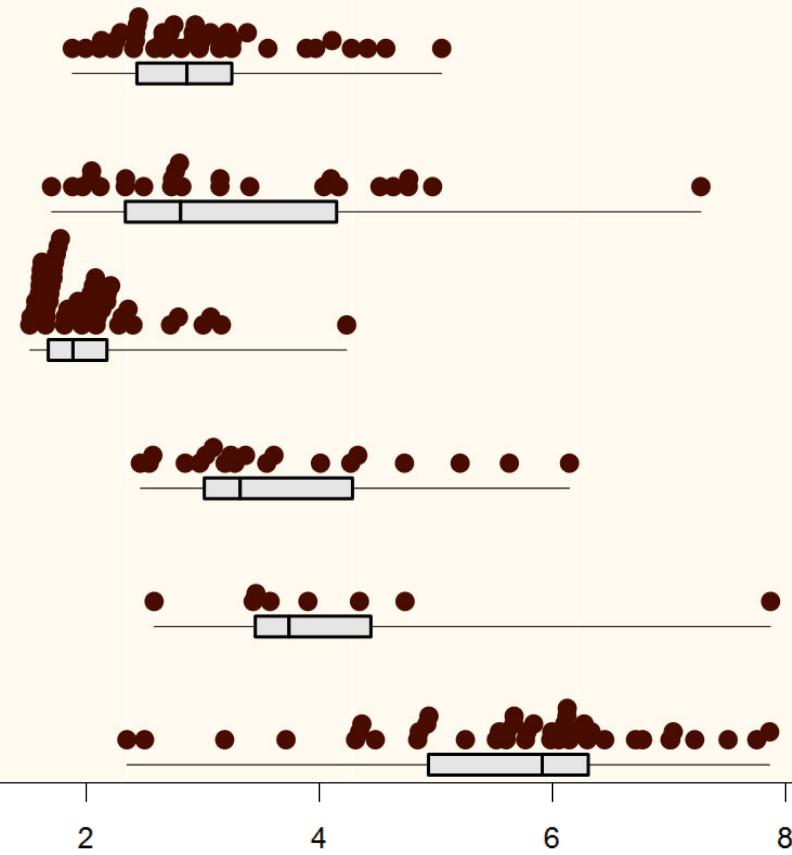
6

8

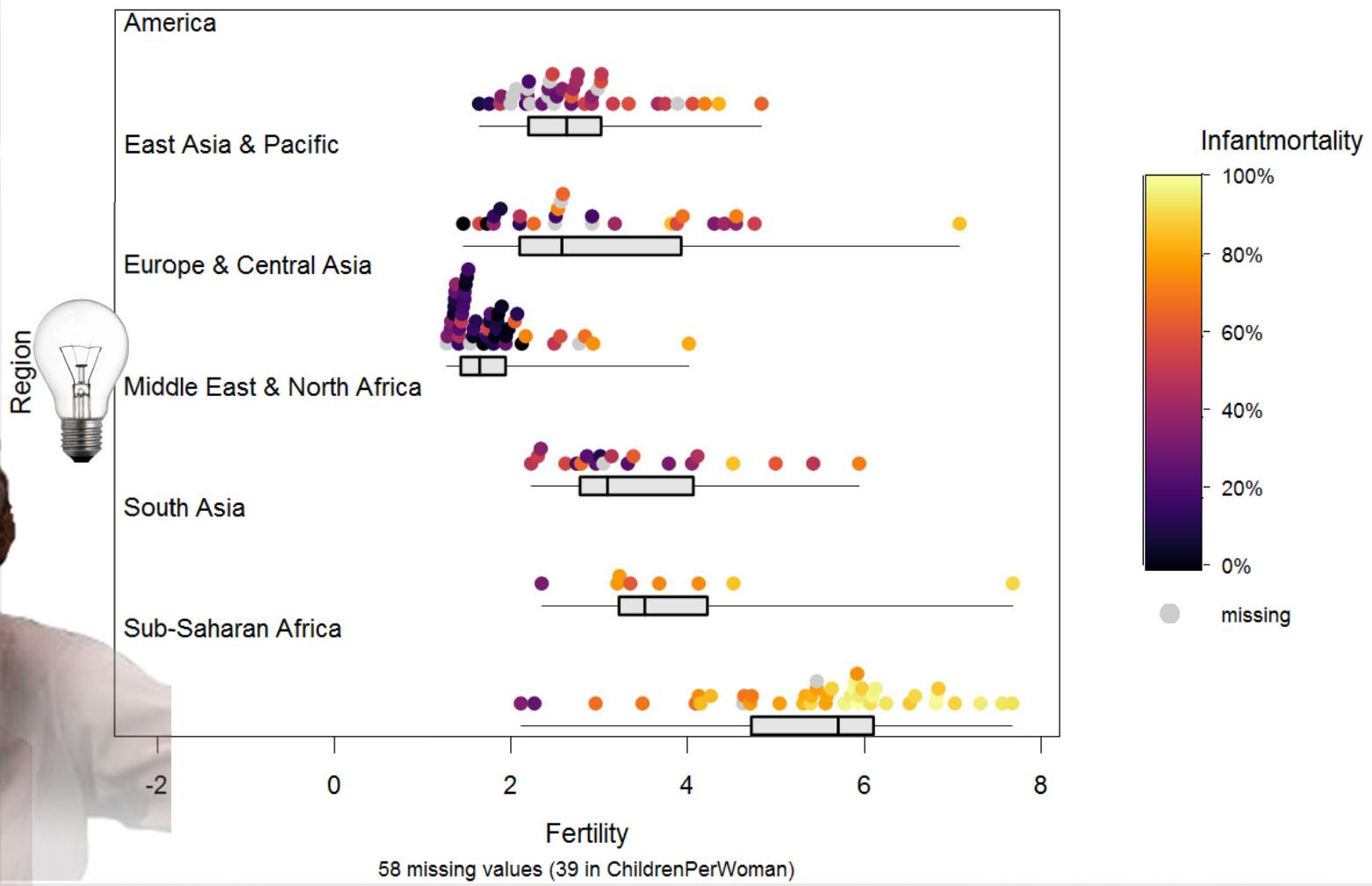
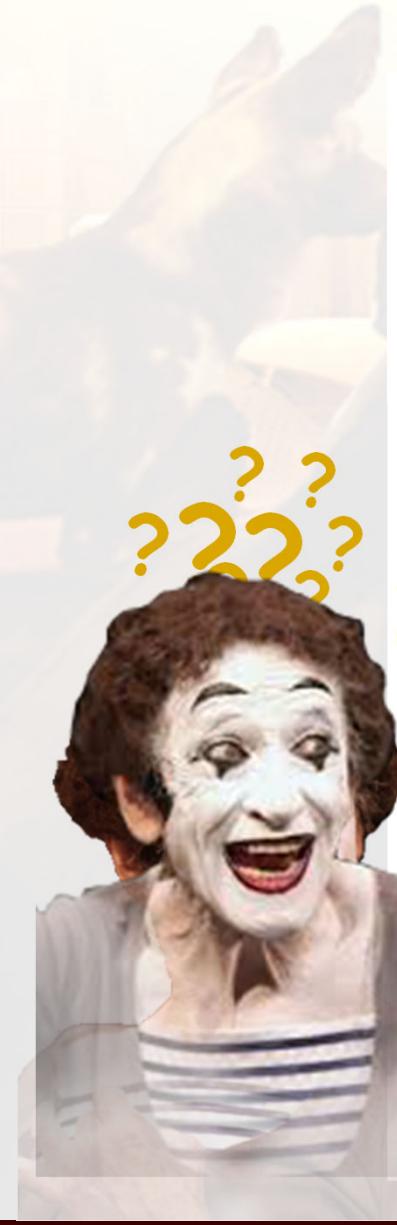
Fertility

39 missing values (39 in ChildrenPerWoman)

Fertility by Region

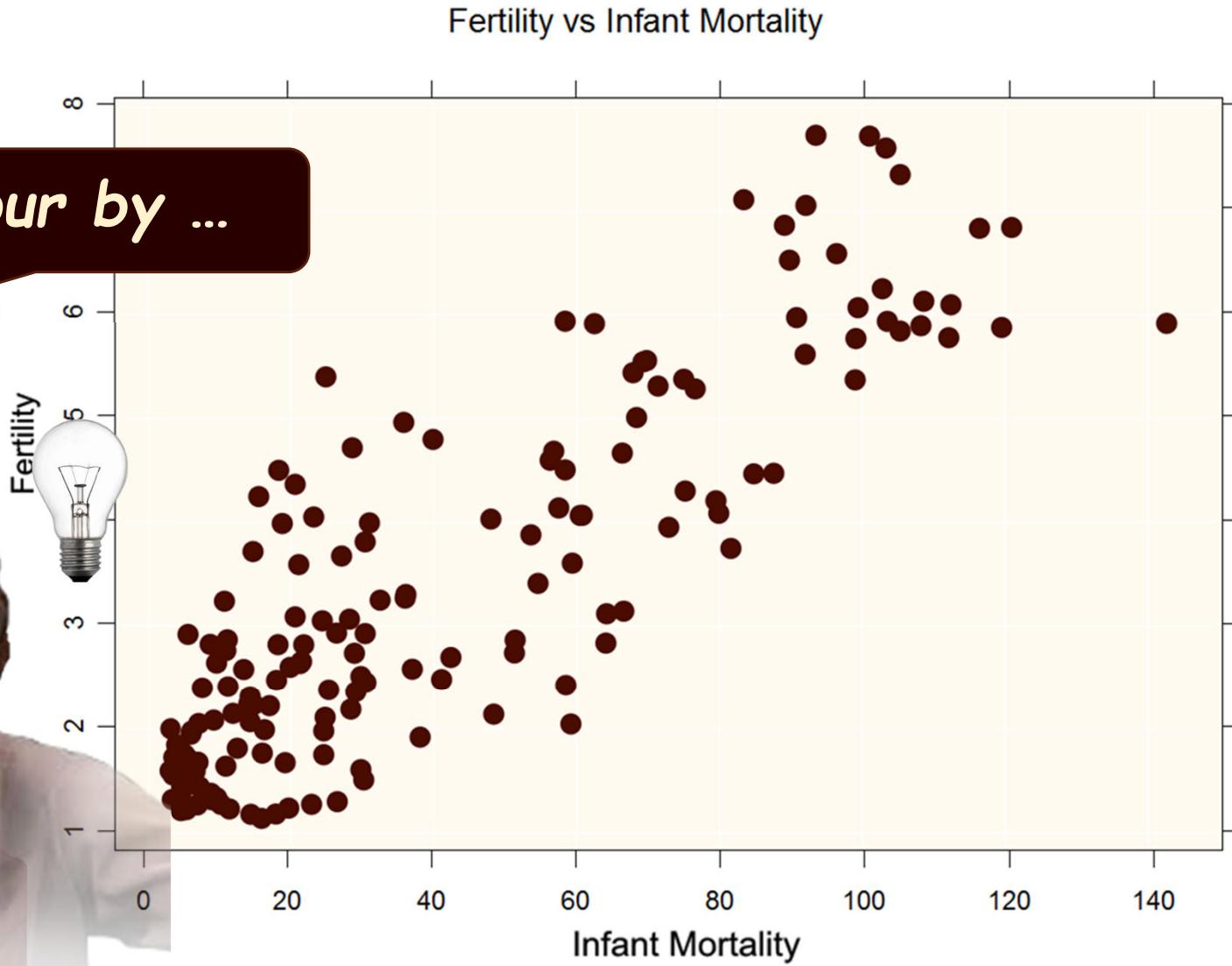


Colour by Infant Mortality

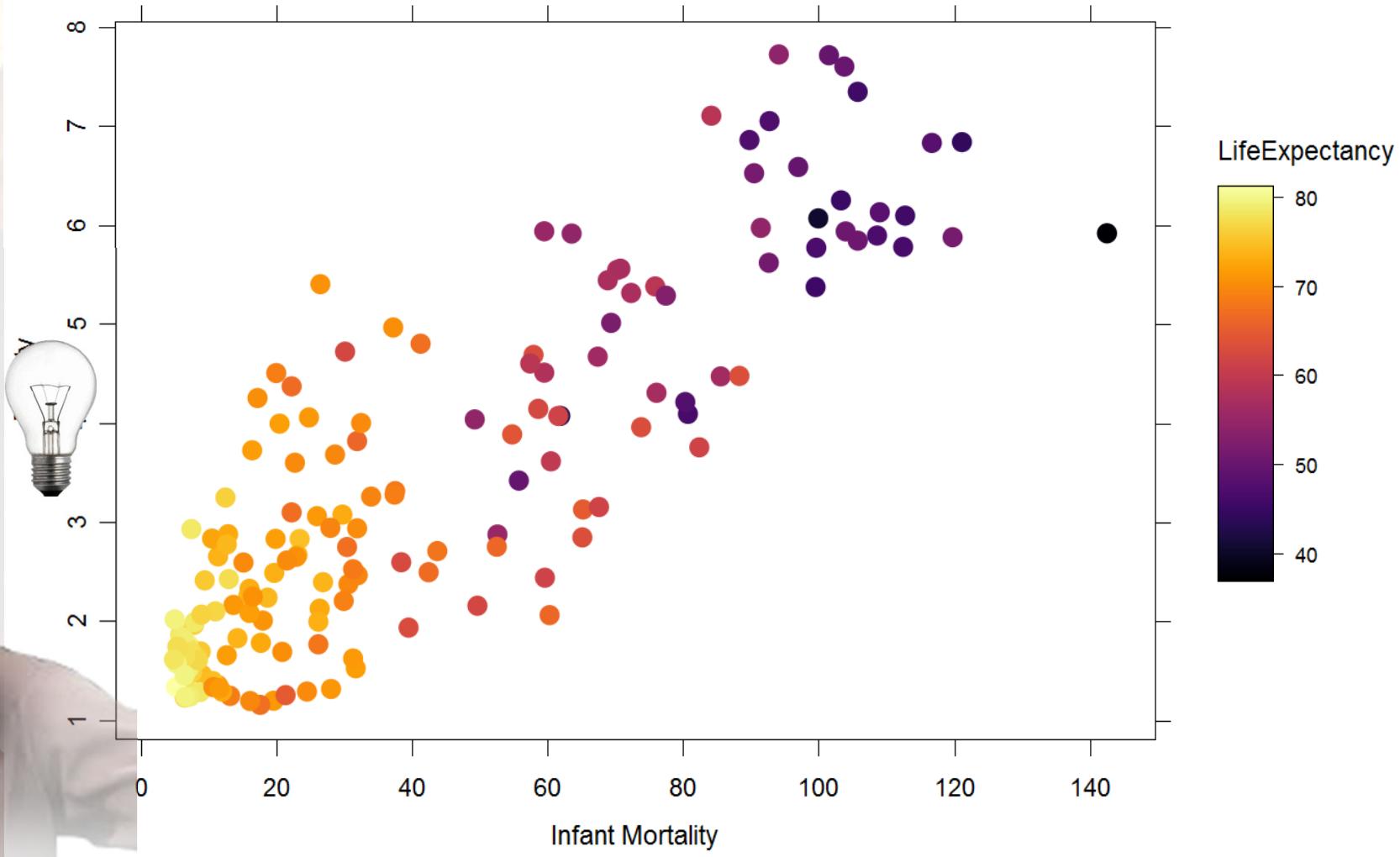
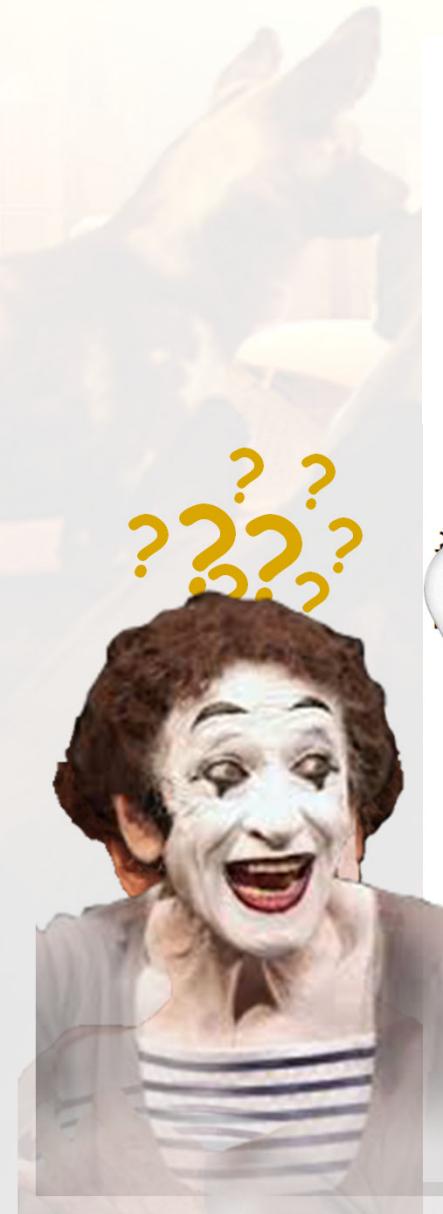


Fertility vs Infant Mortality

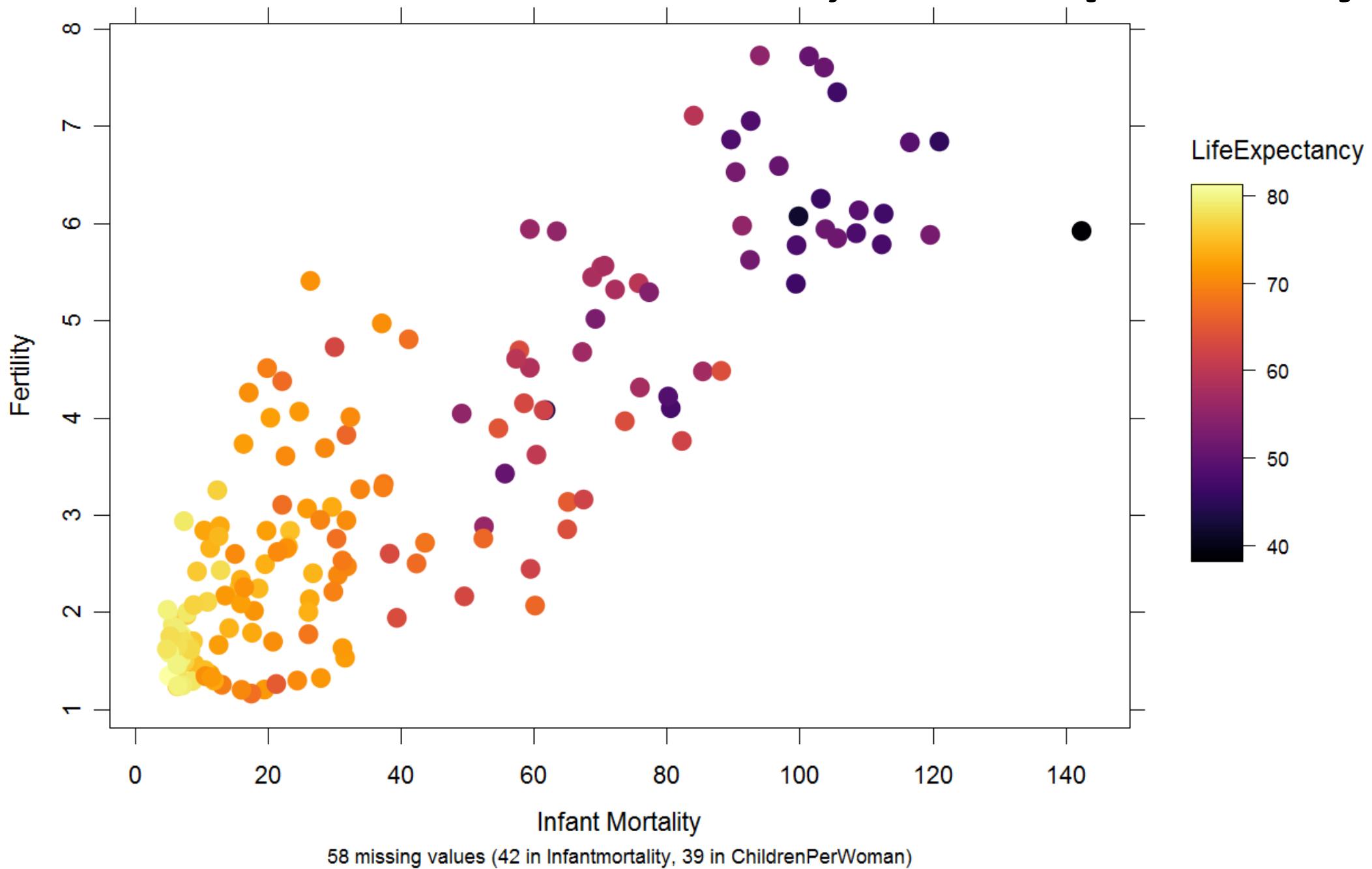
Colour by ...



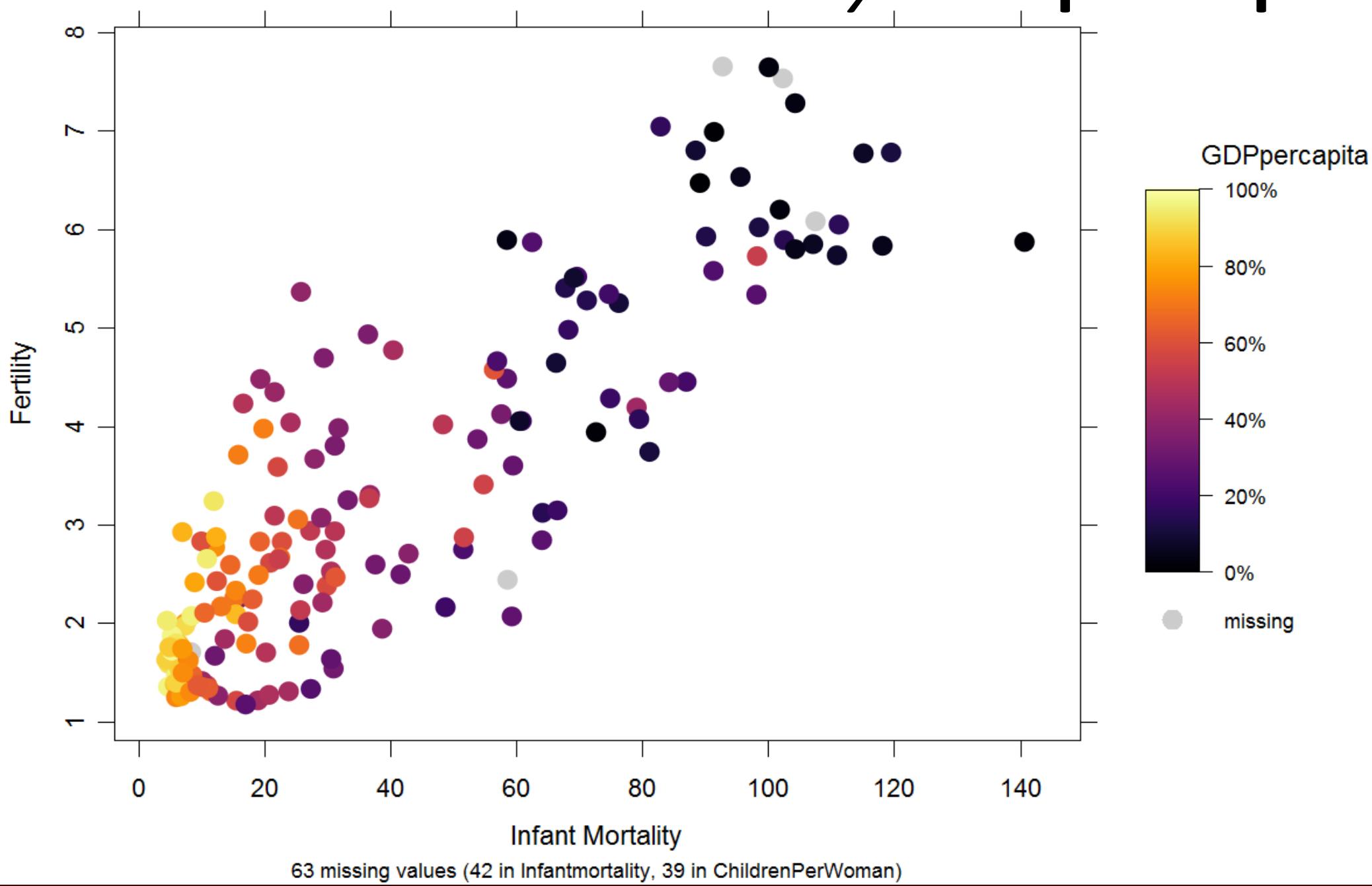
Colour by Life Expectancy



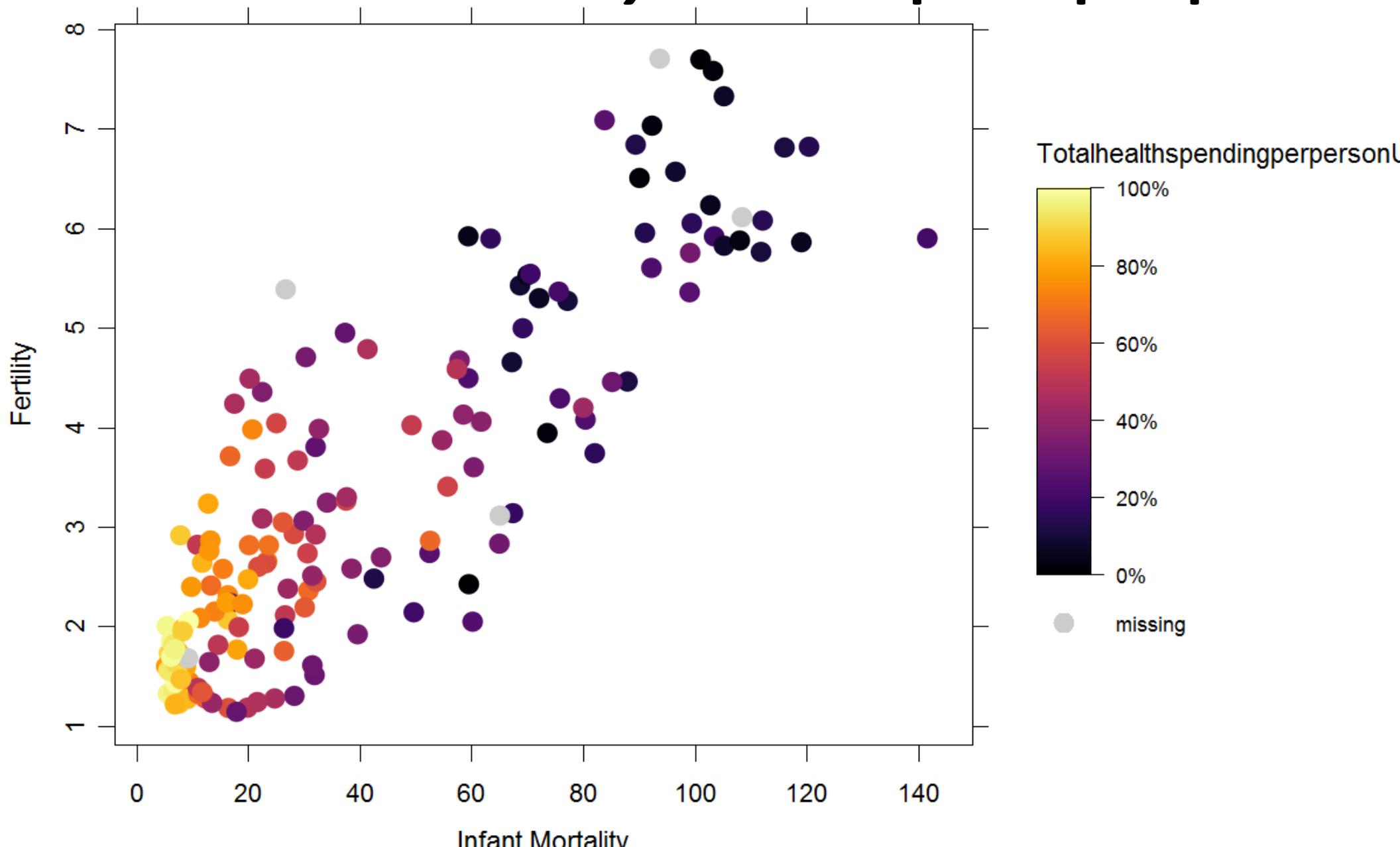
Colour by Life Expectancy



Colour by GDP per capita



Colour by Health spend per person



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

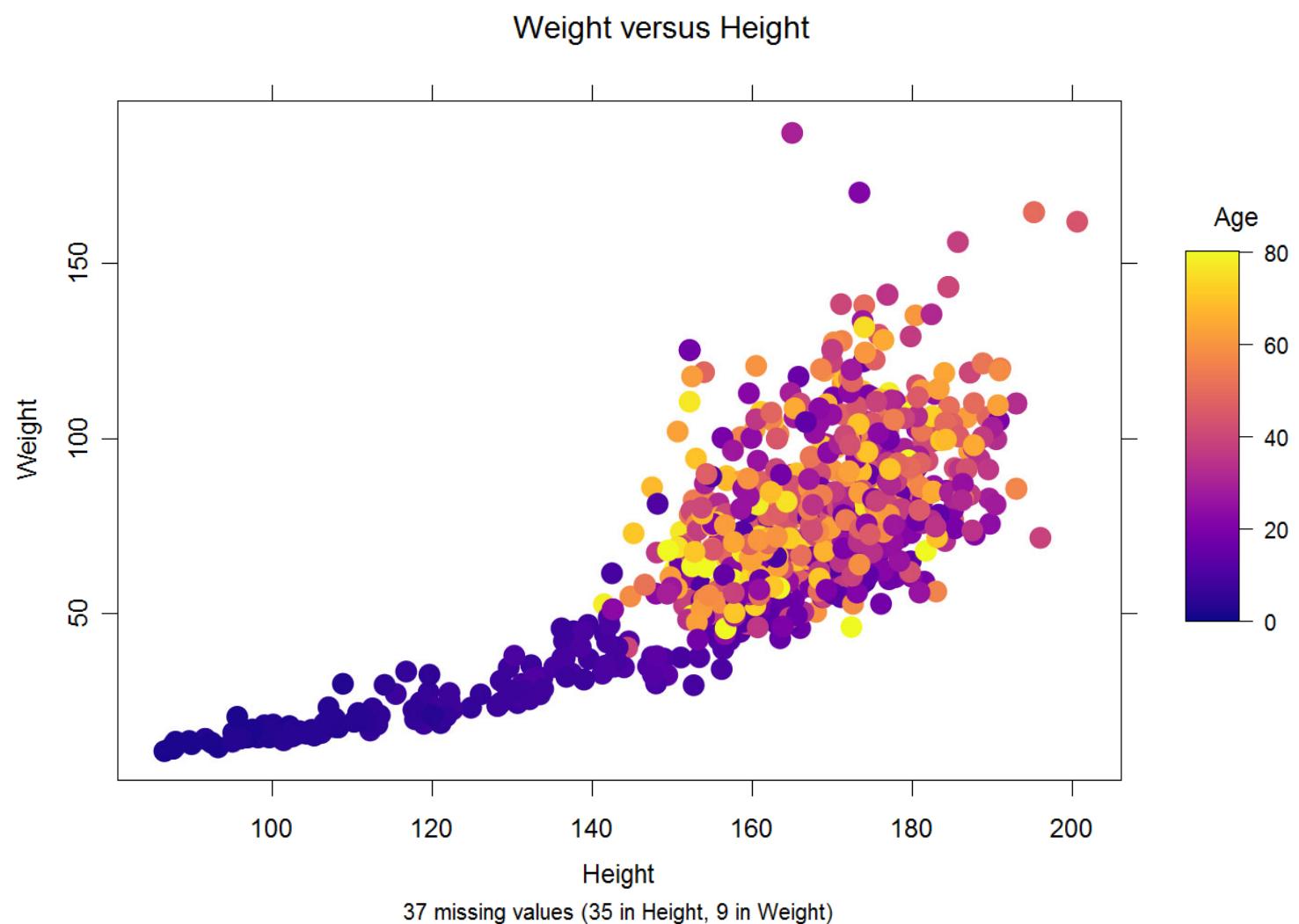




... Stepping in Colour space

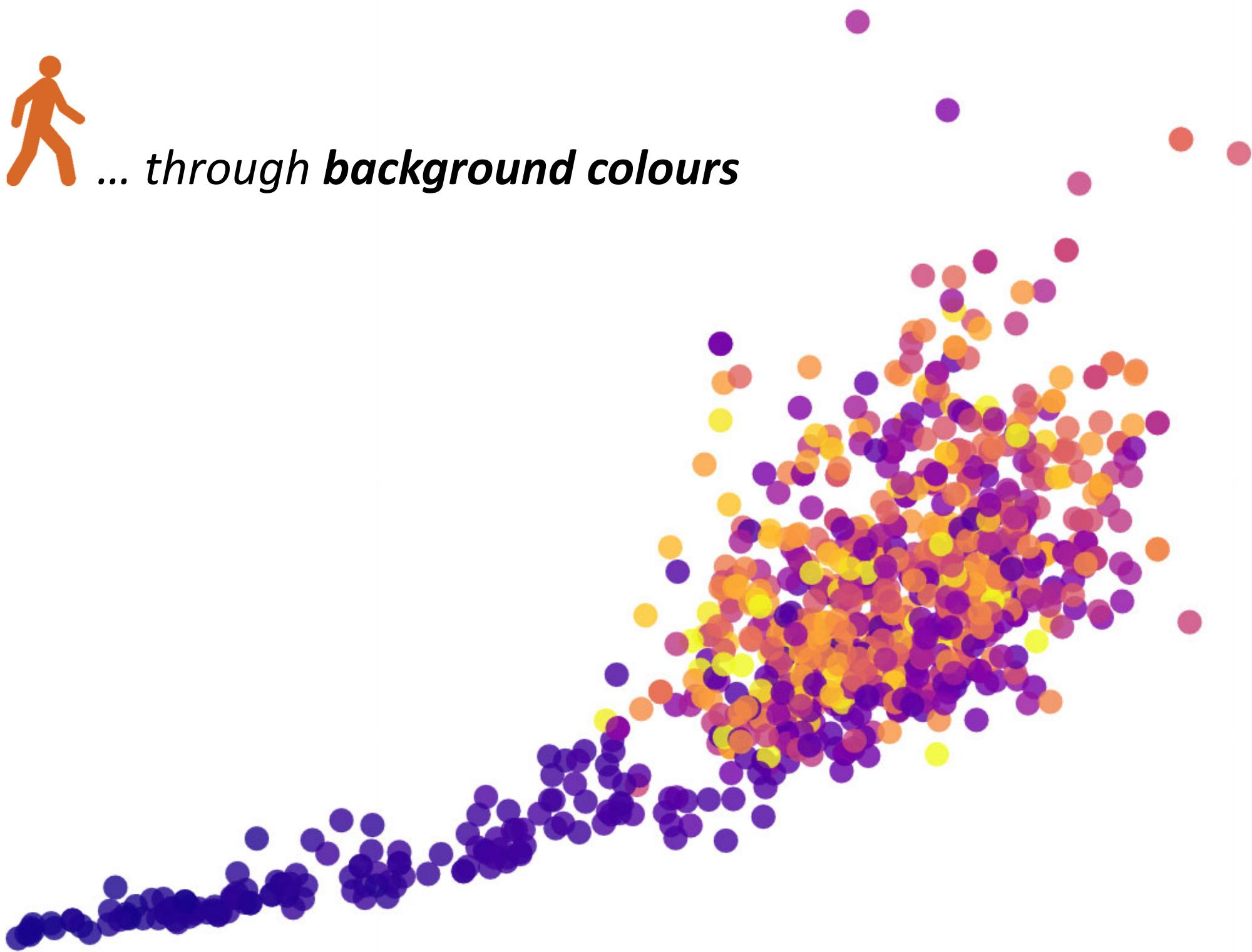


... through background colours



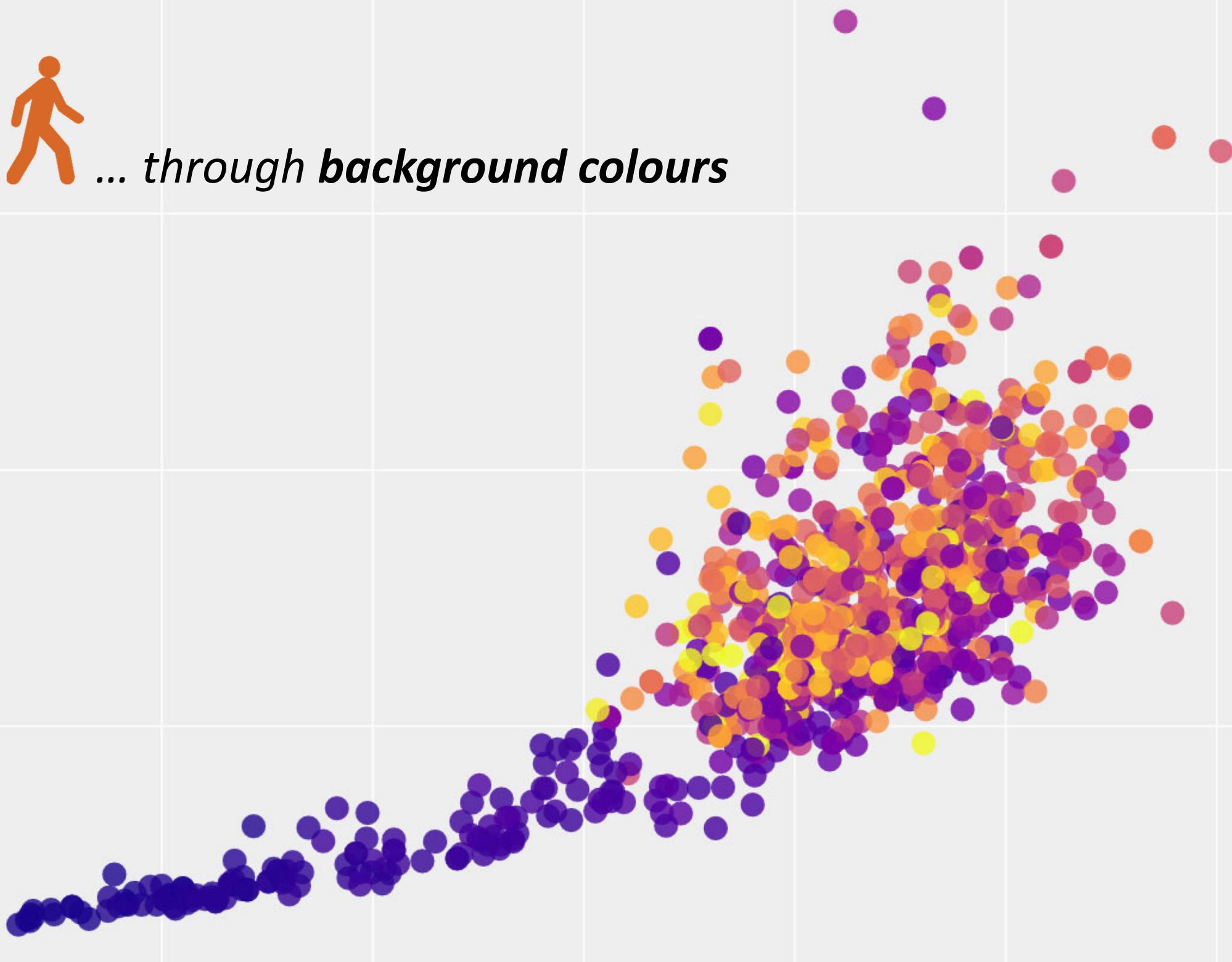


... through background colours



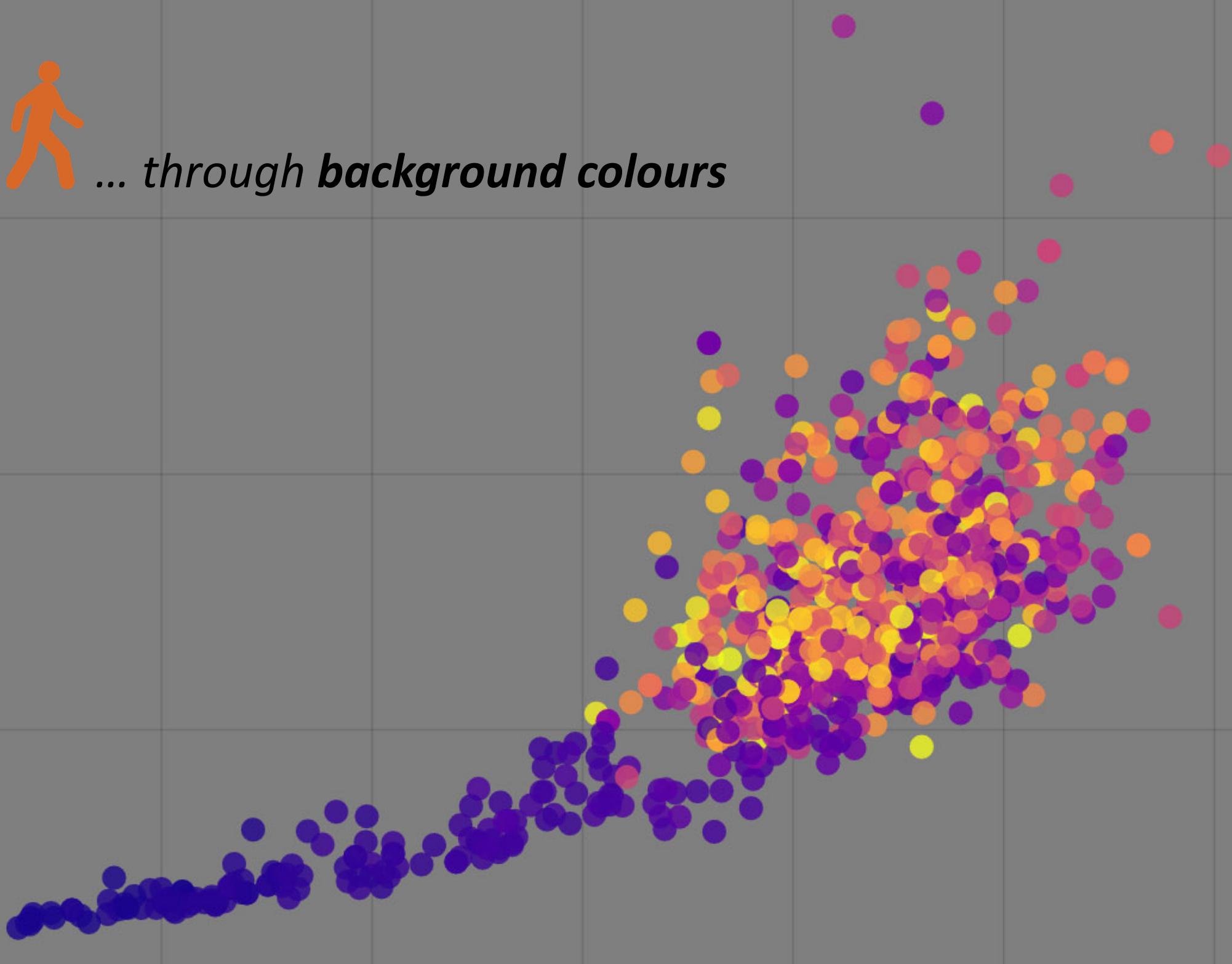


... through background colours



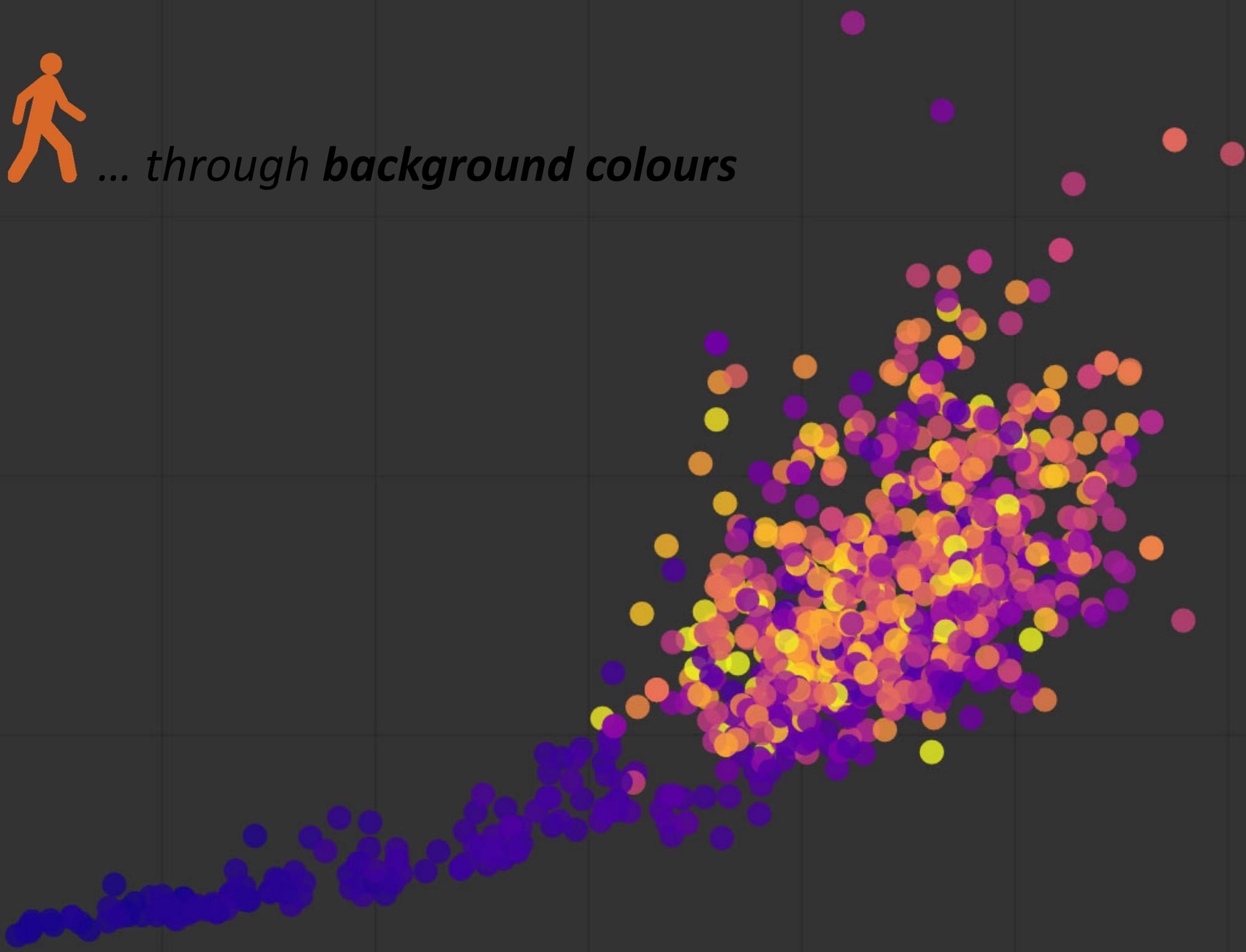


... through background colours



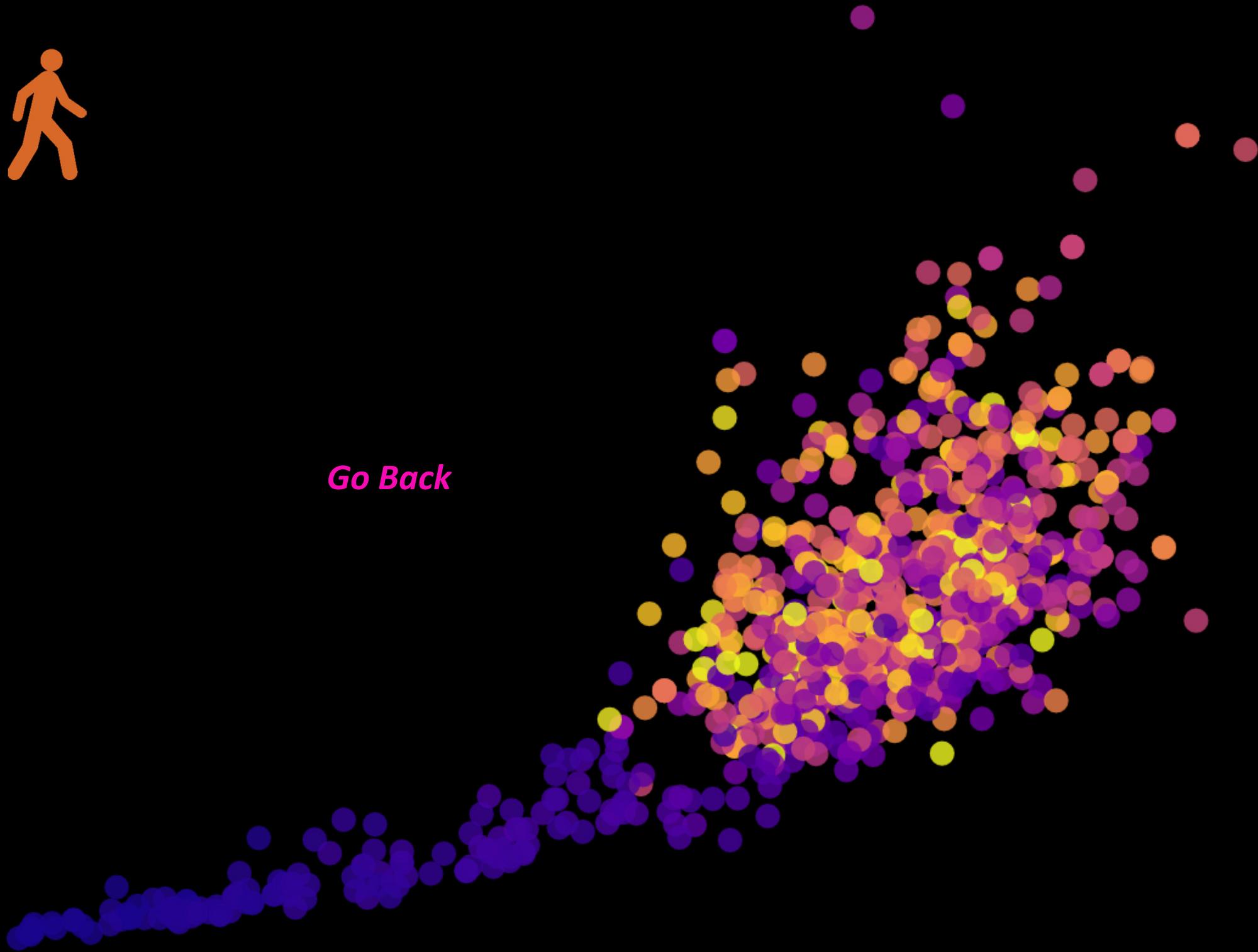


... through background colours





Go Back



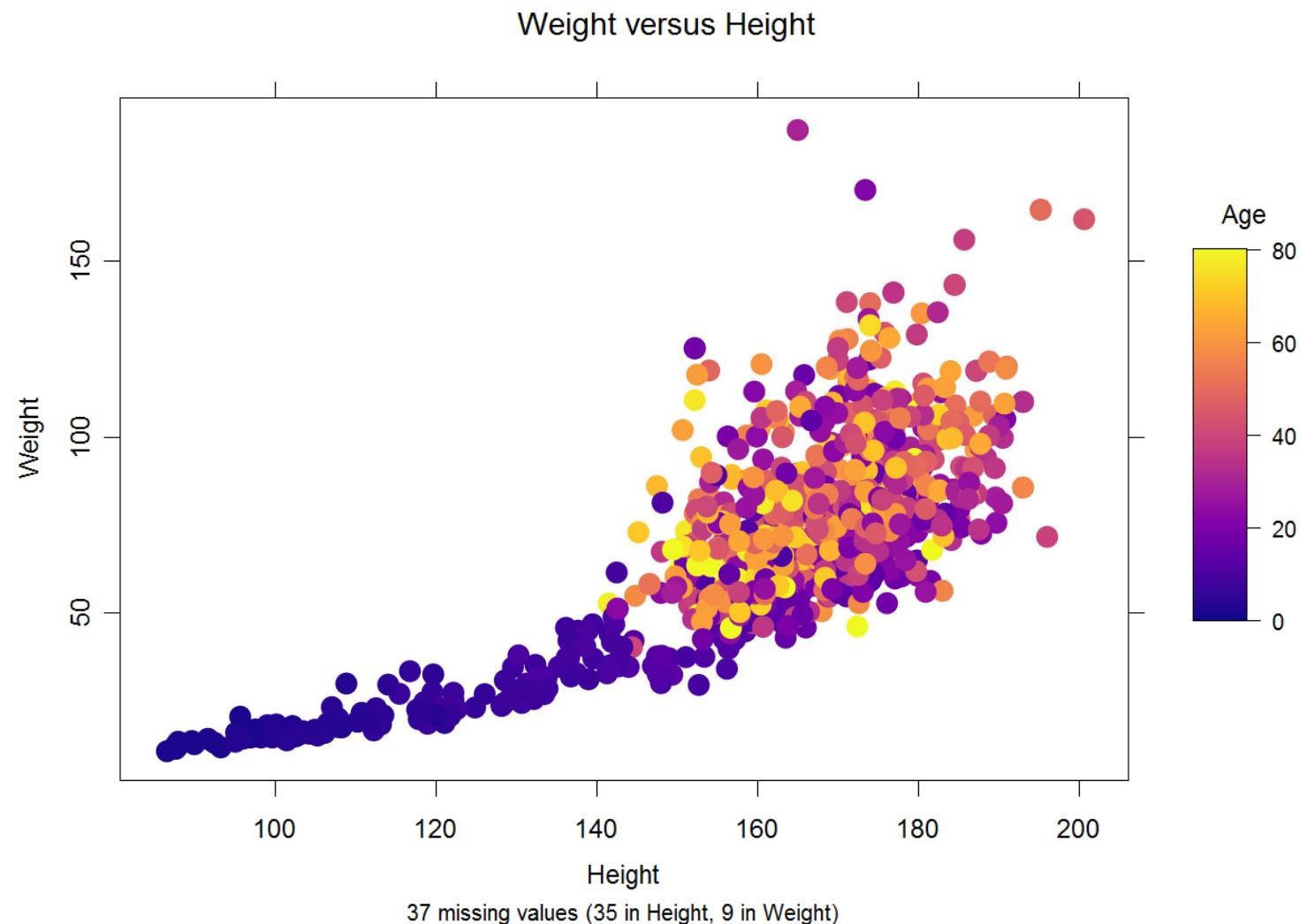


*Background
matters*



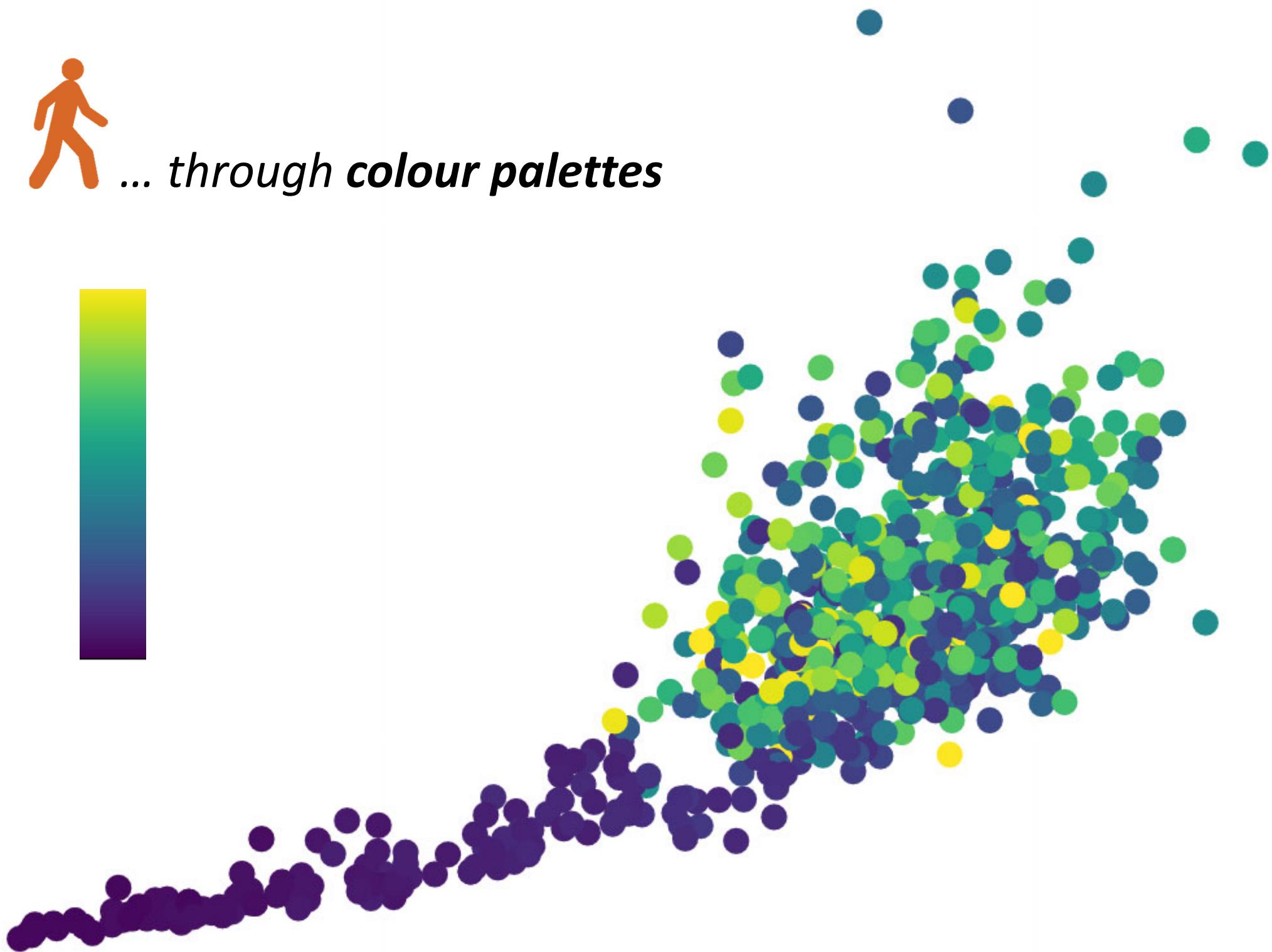
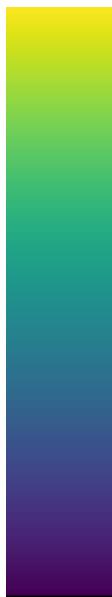


... through colour palettes



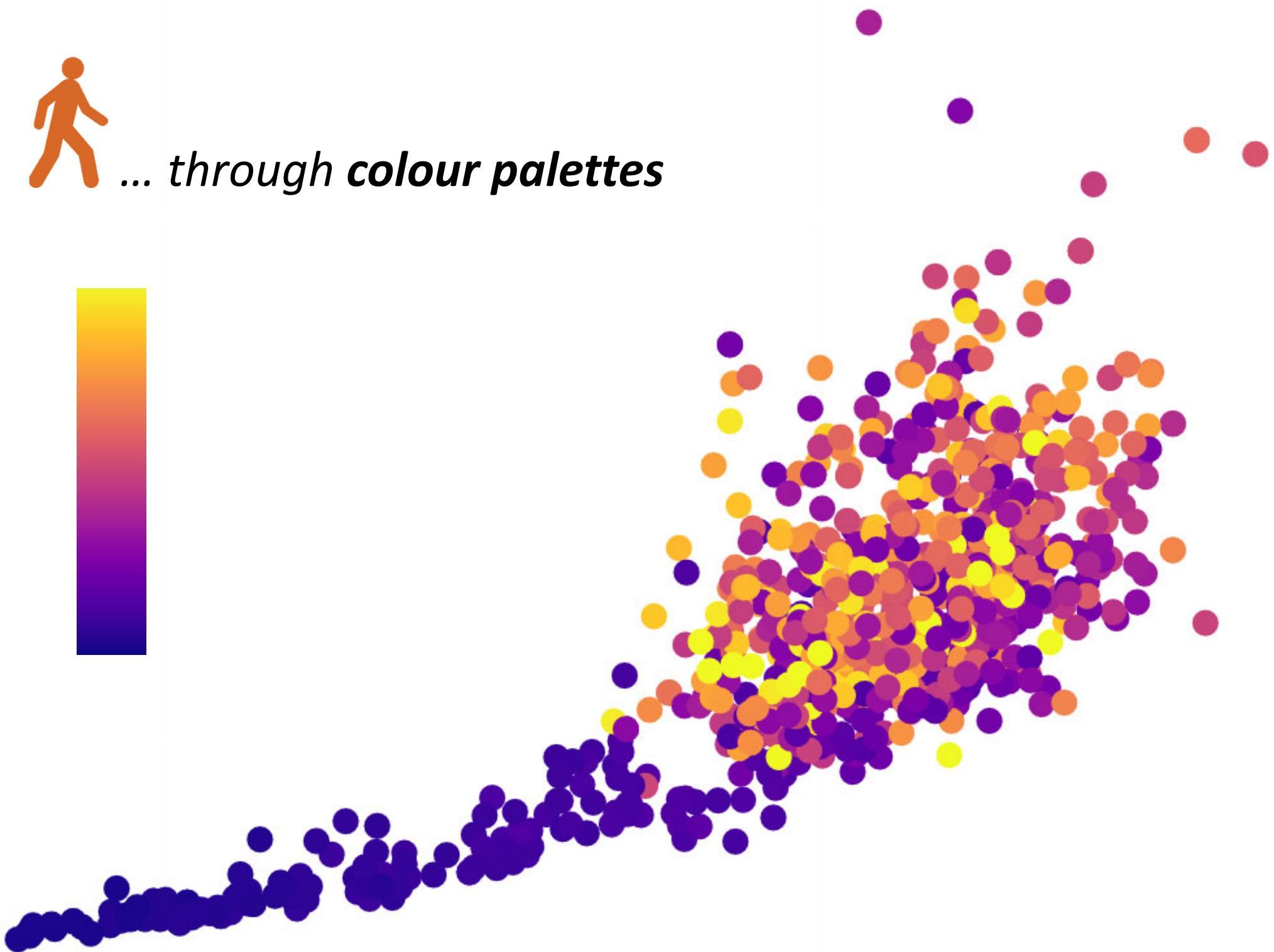


... through colour palettes



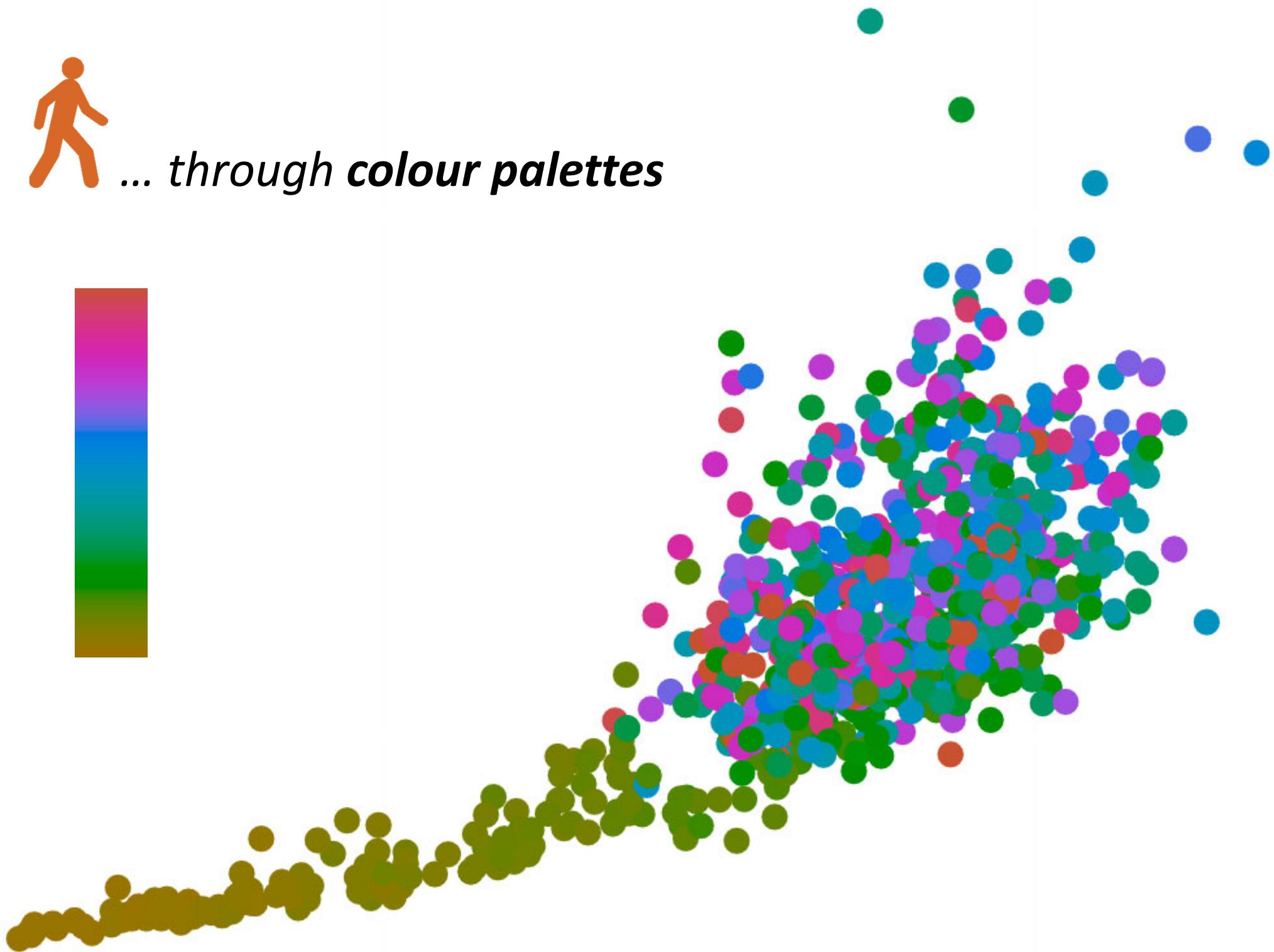
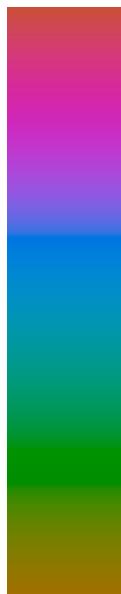


... through colour palettes



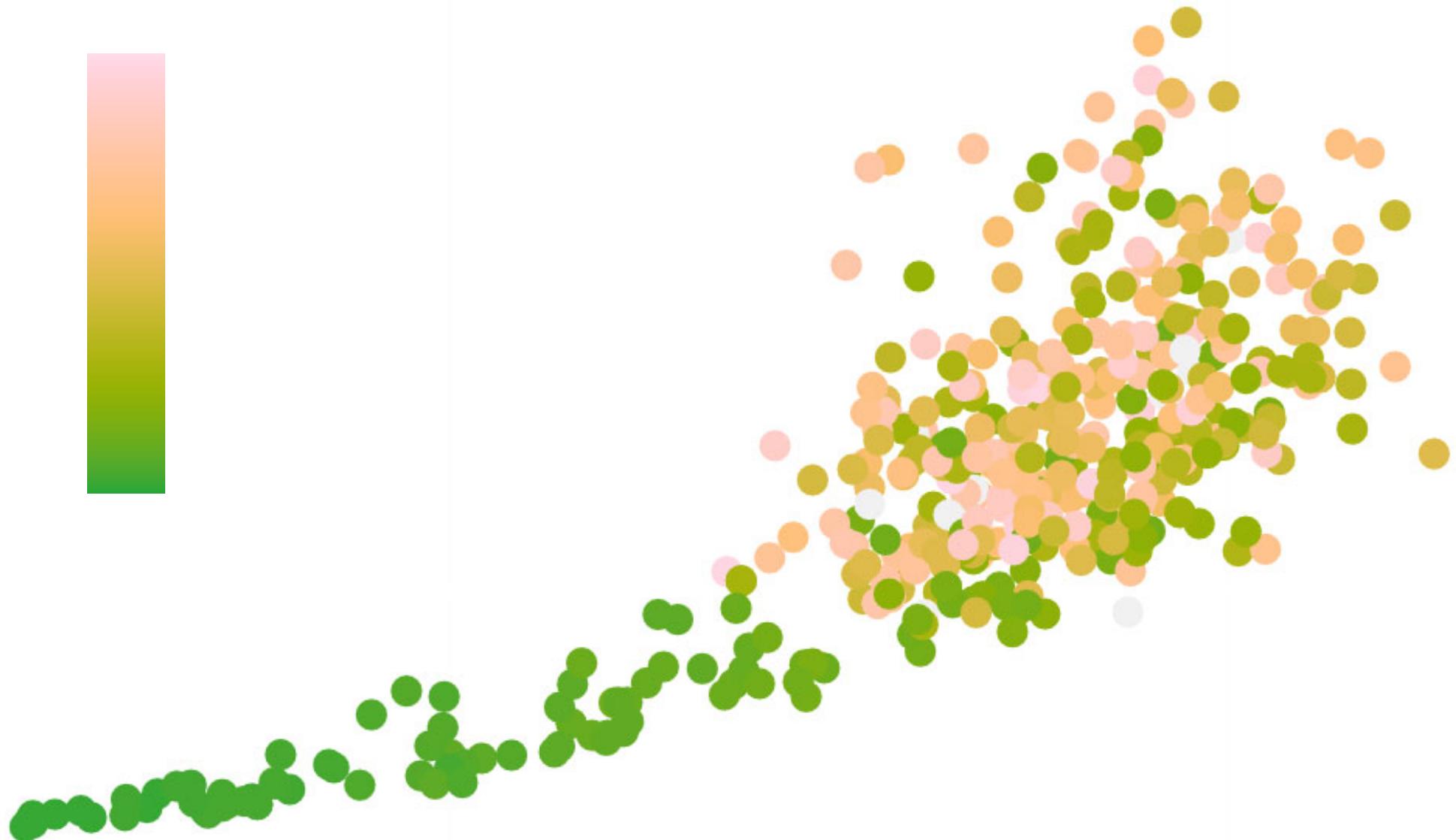


... through colour palettes



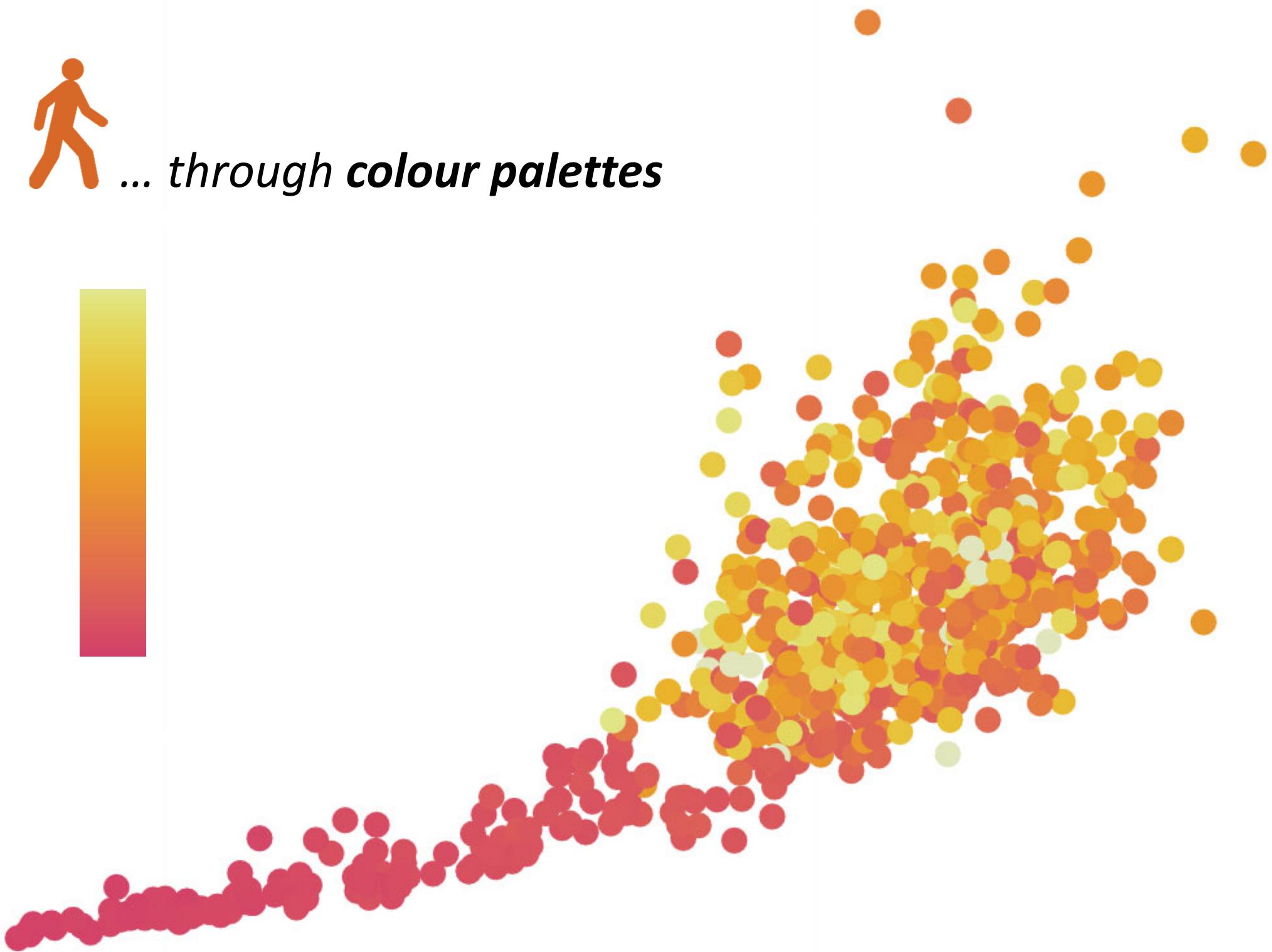


... through colour palettes



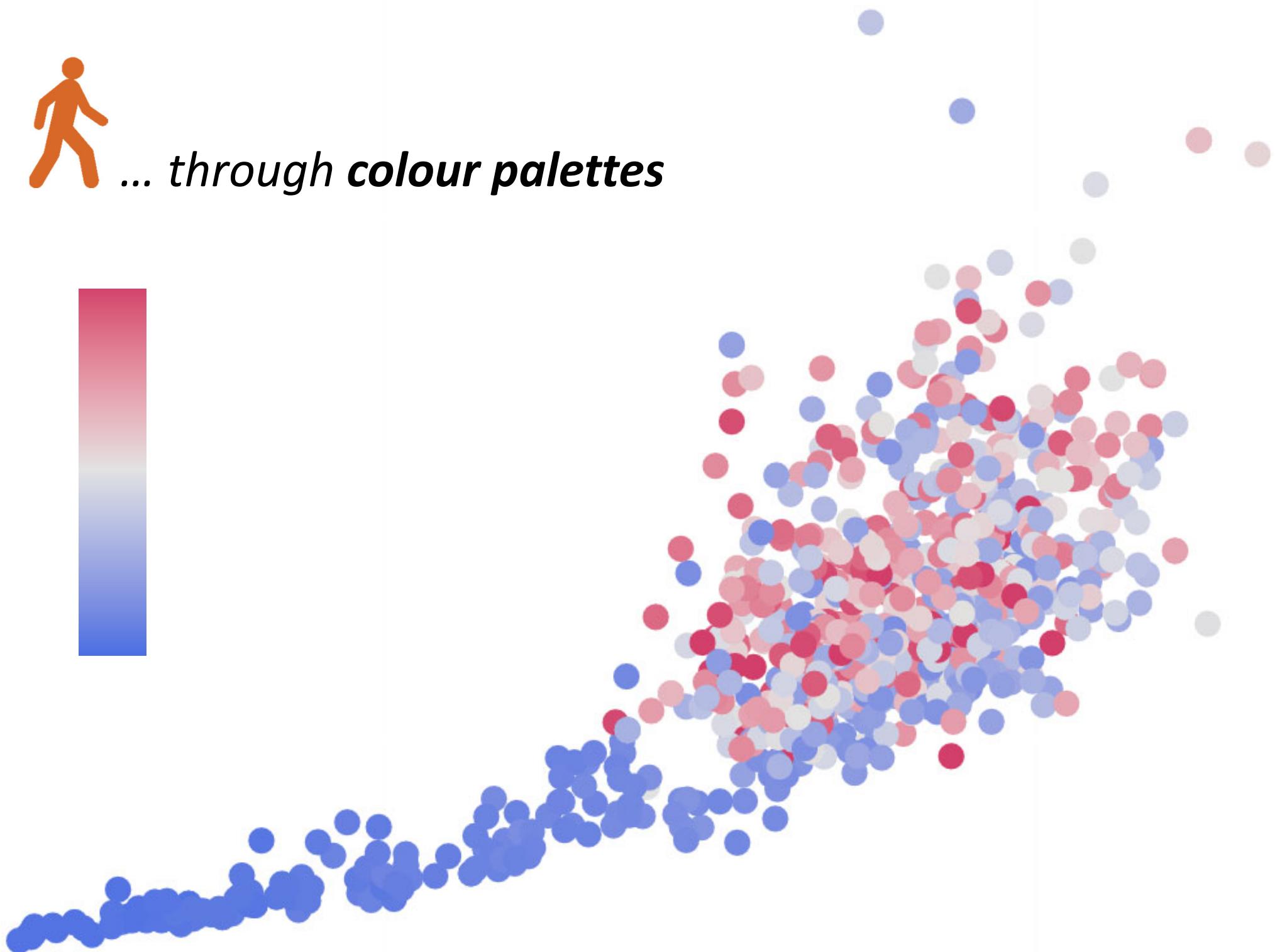


... through colour palettes

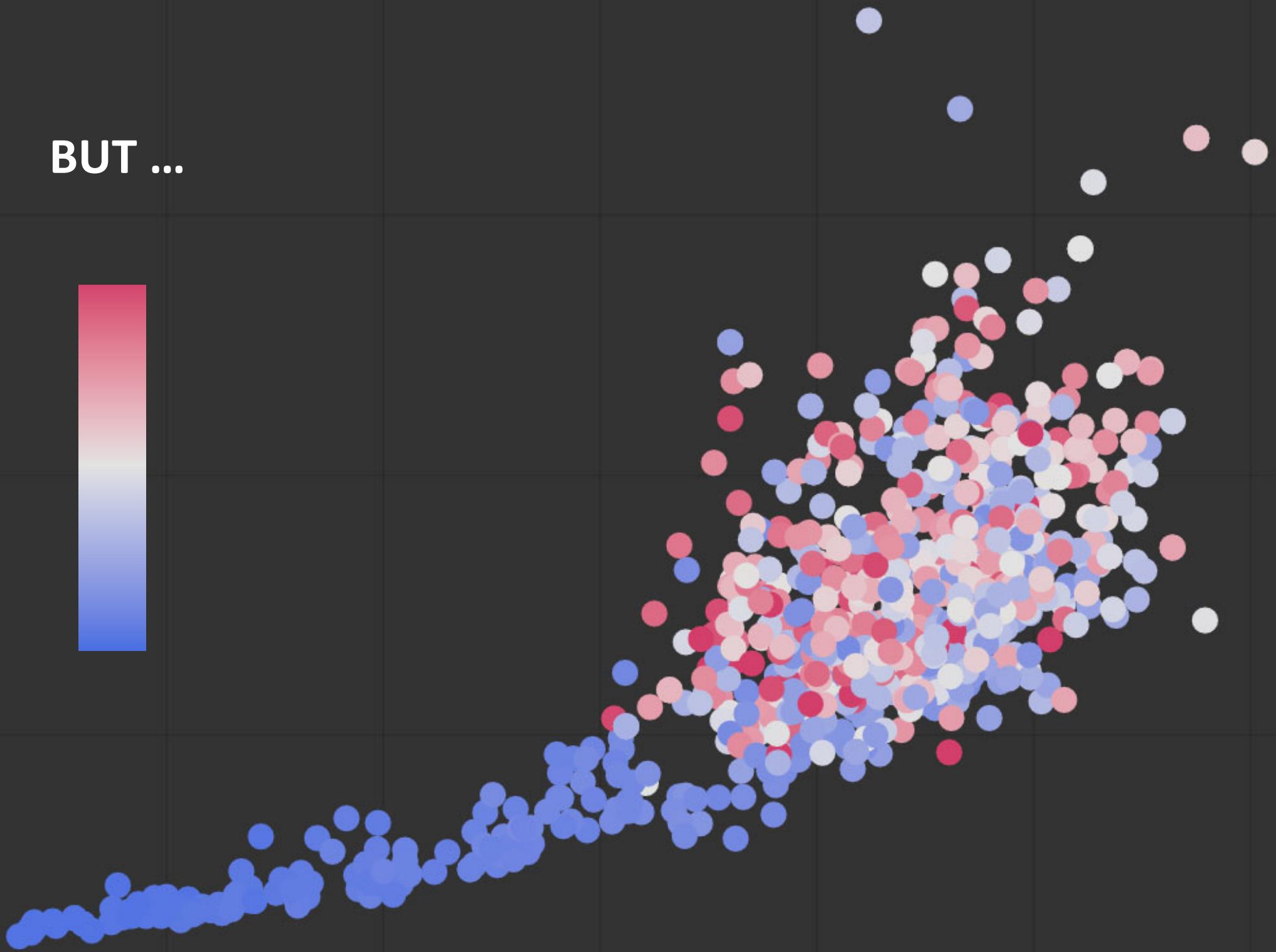




... through colour palettes



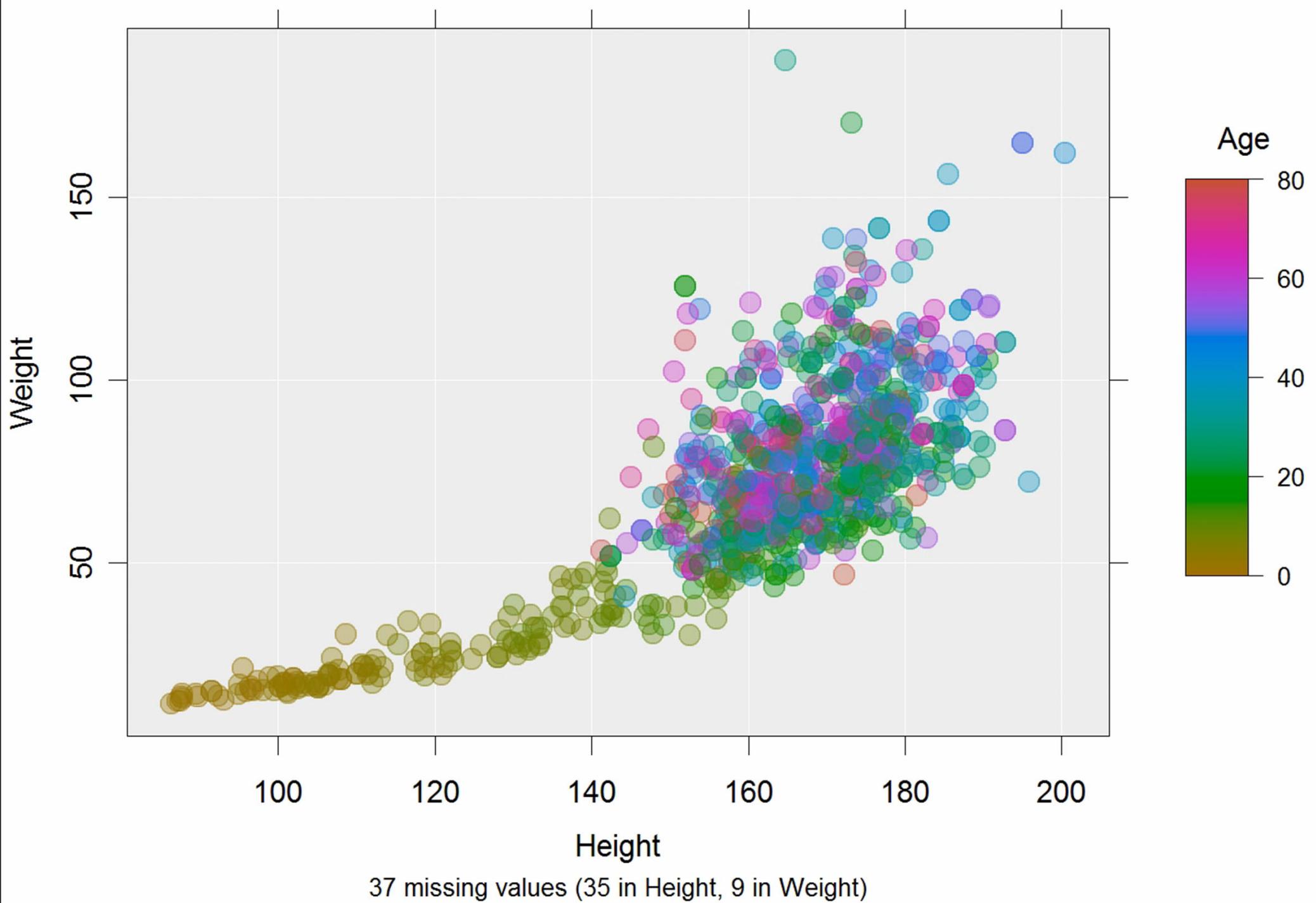
BUT ...





... through colour groups

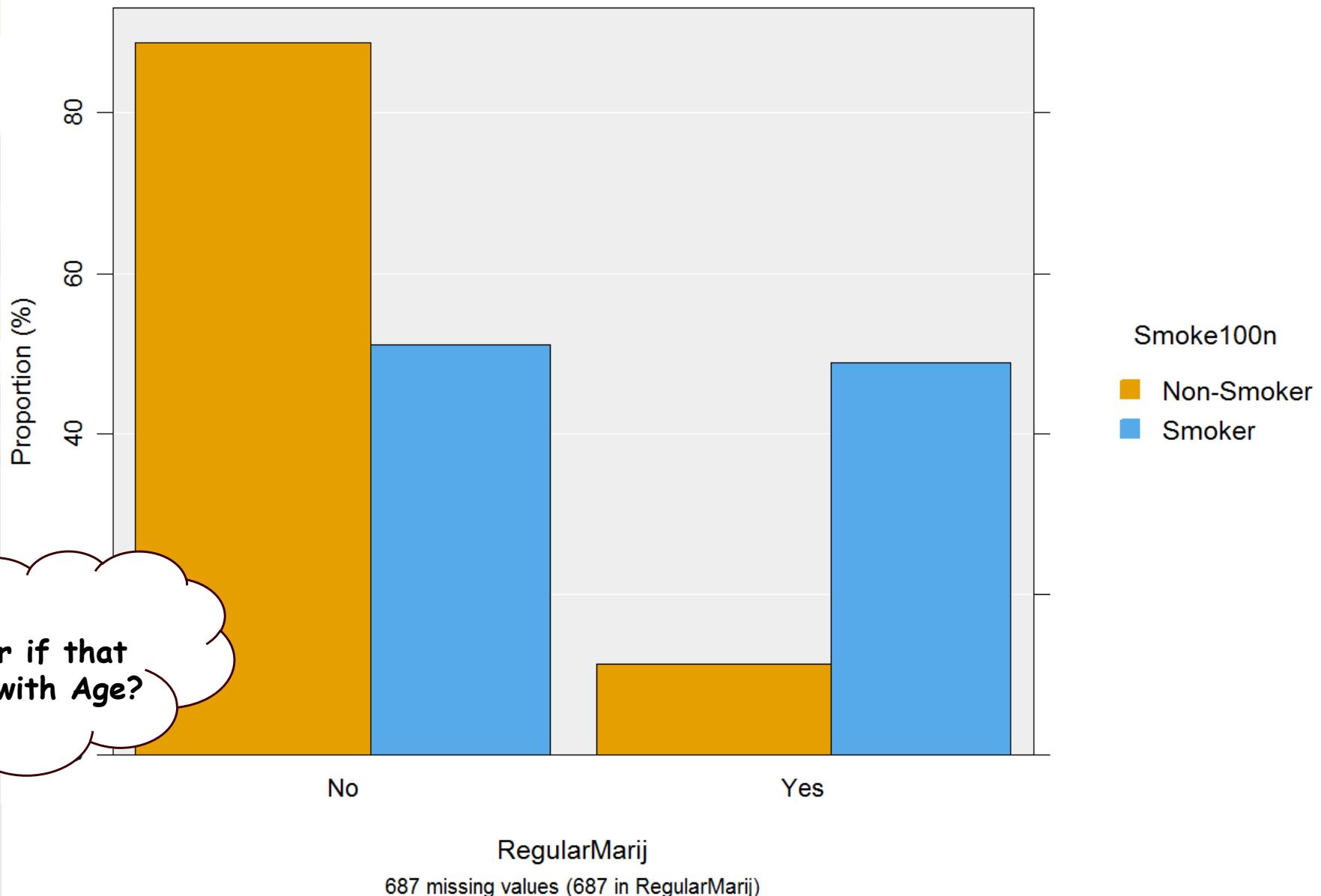
Weight versus Height



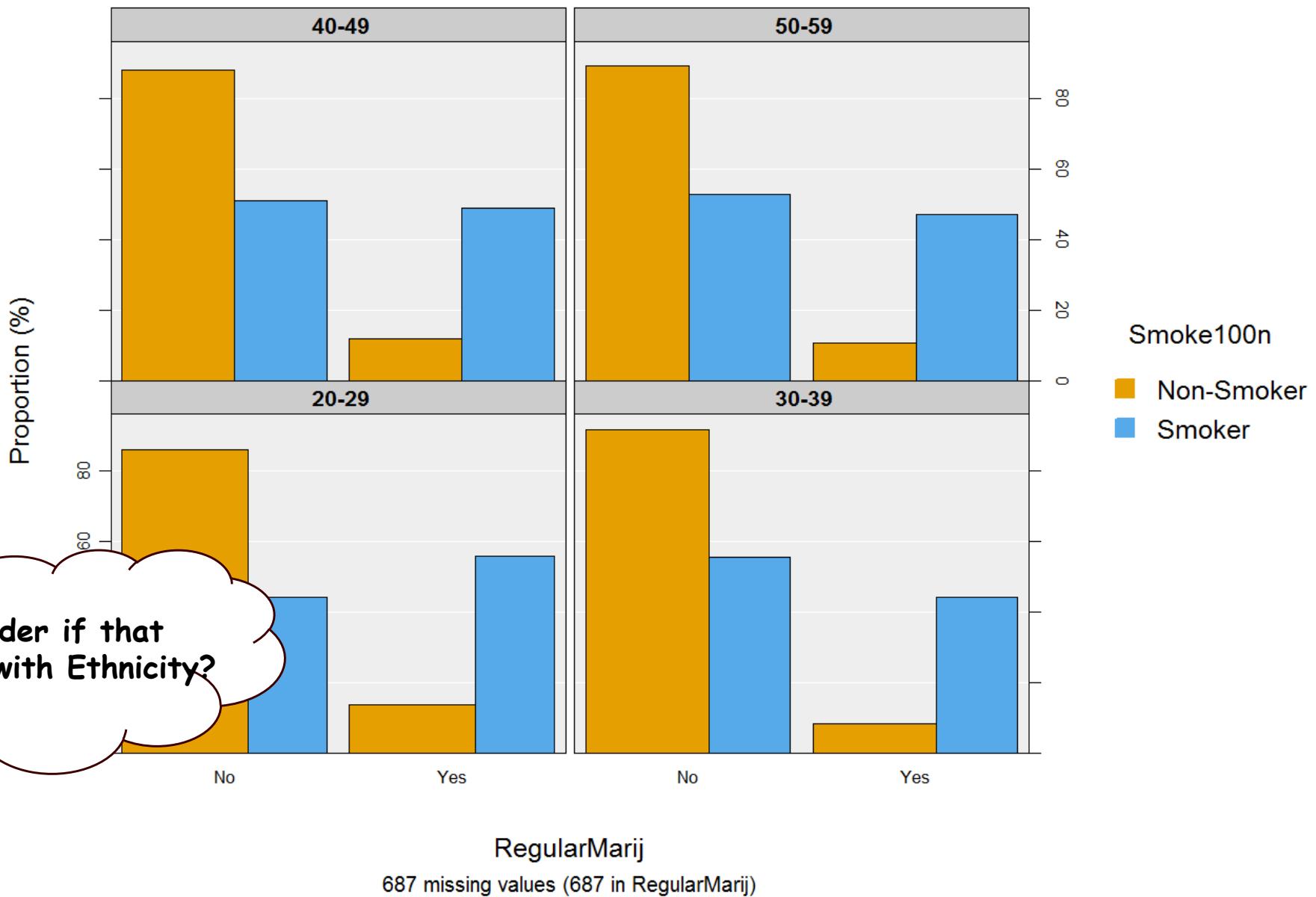
Subsetting ...



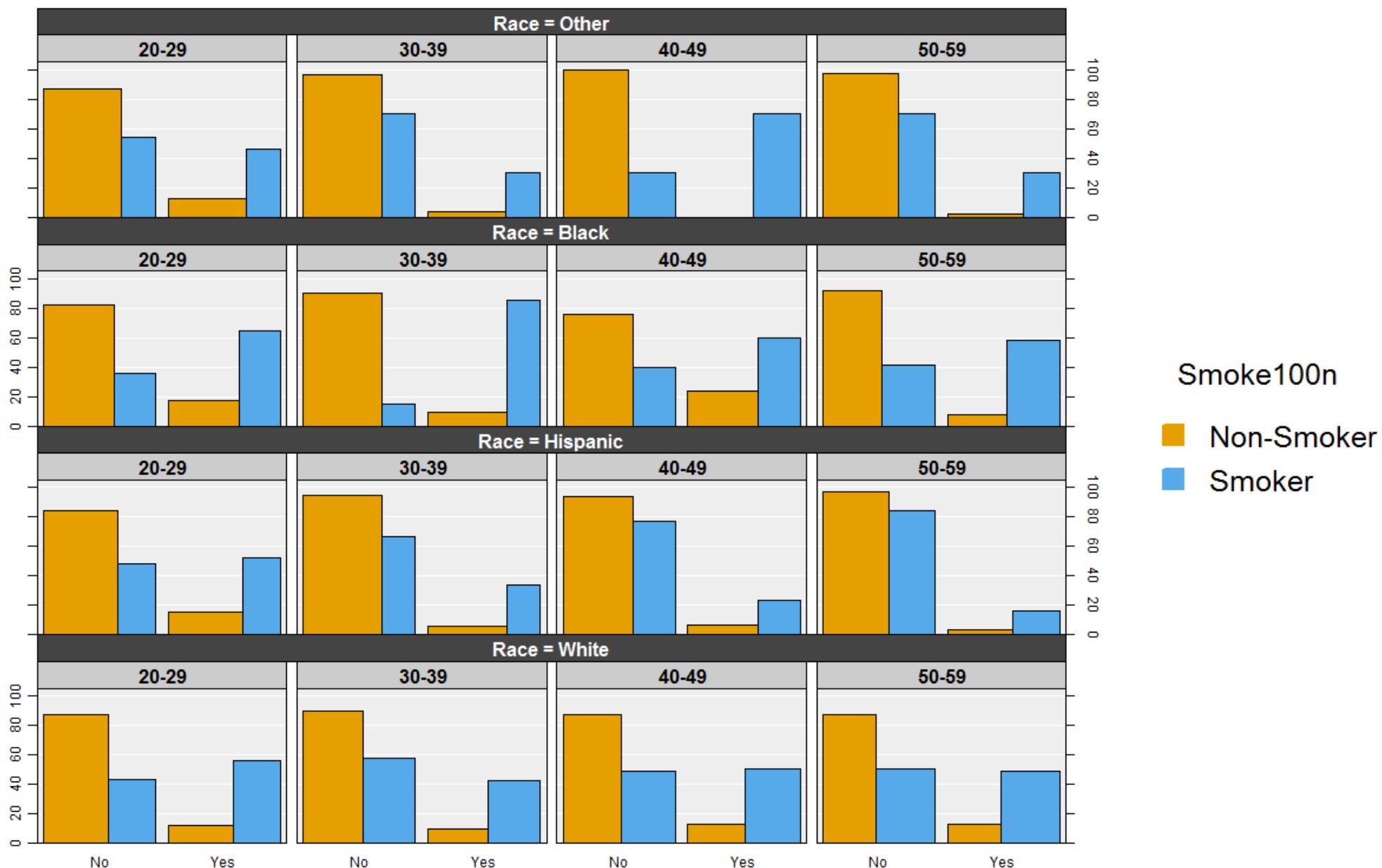
Distribution of RegularMarij by Smoke100n



Distribution of RegularMarij by Smoke100n subset by AgeDecade



Distribution of RegularMarij by Smoke100n subset by AgeDecade and Race



RegularMarij

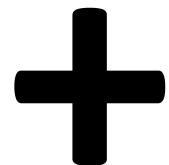
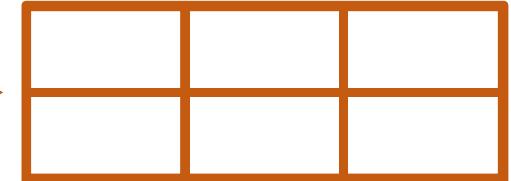
687 missing values (687 in RegularMarij)

Motion ...



Mathematically speaking ...

Subsetting

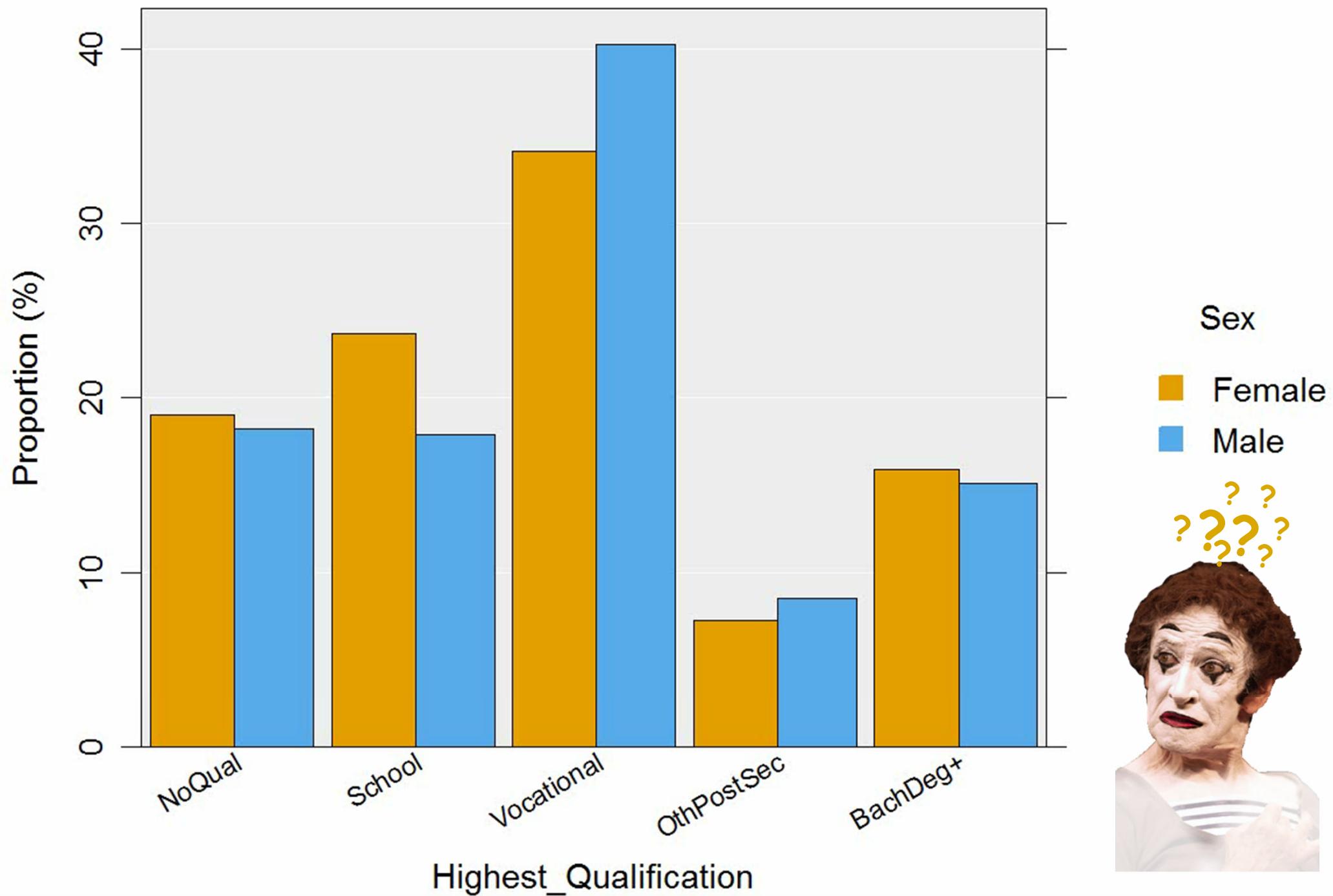


... Stepping through subsets



Motion ...

Distribution of Highest Qualification by Sex

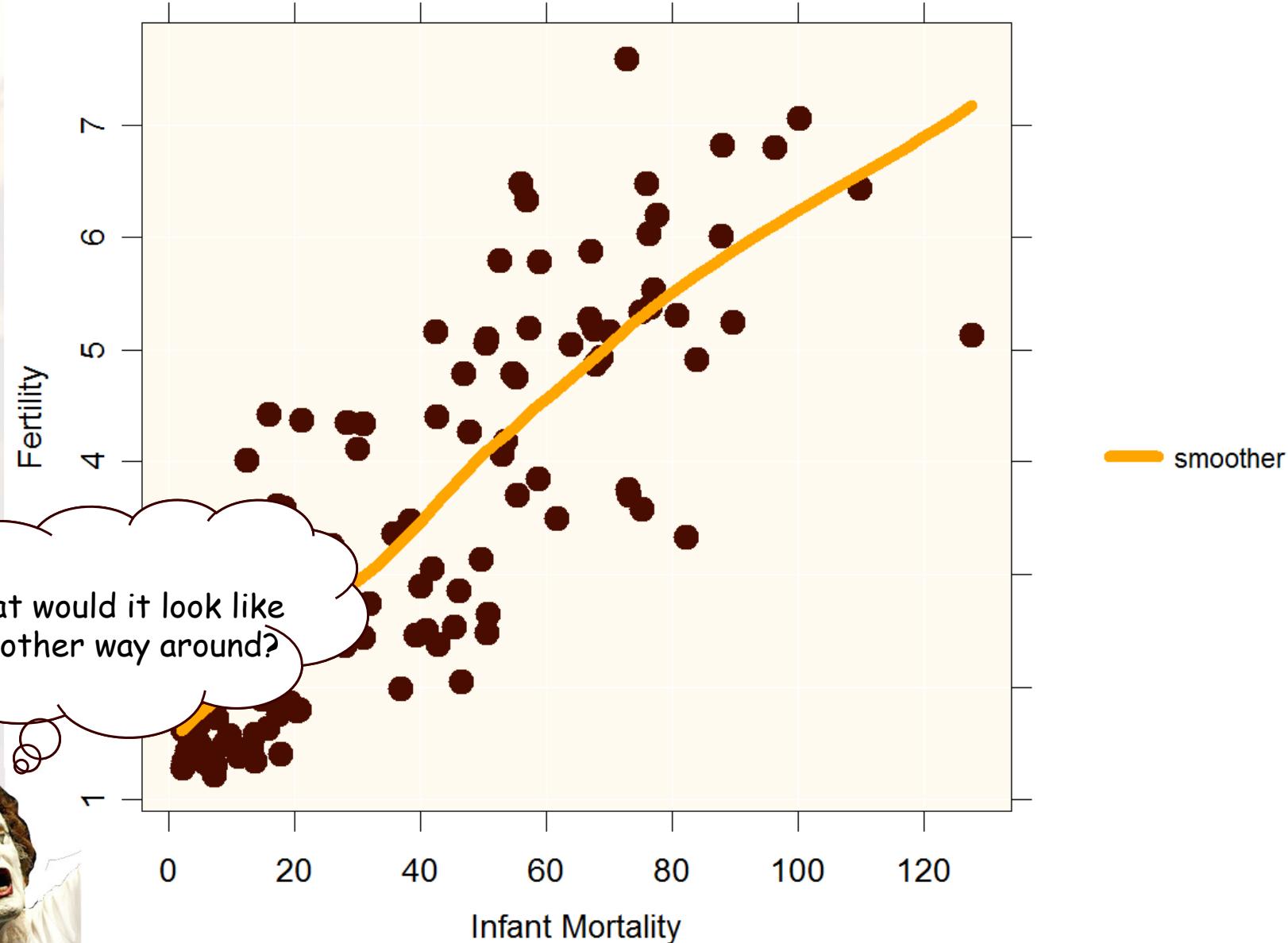




Bait & switch ...

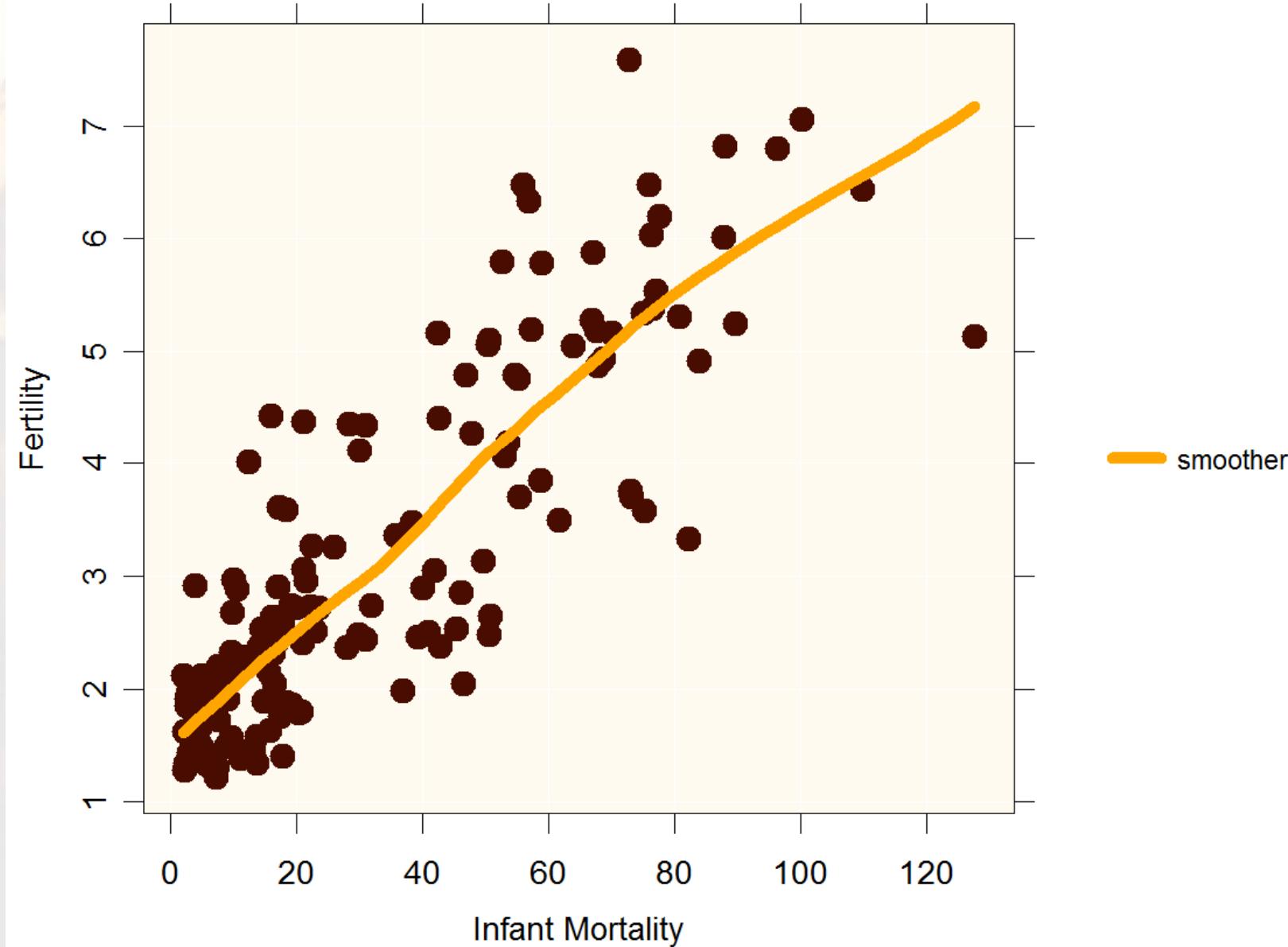
Switching the roles of variables: Switching “X and Y”

Fertility vs Infant Mortality



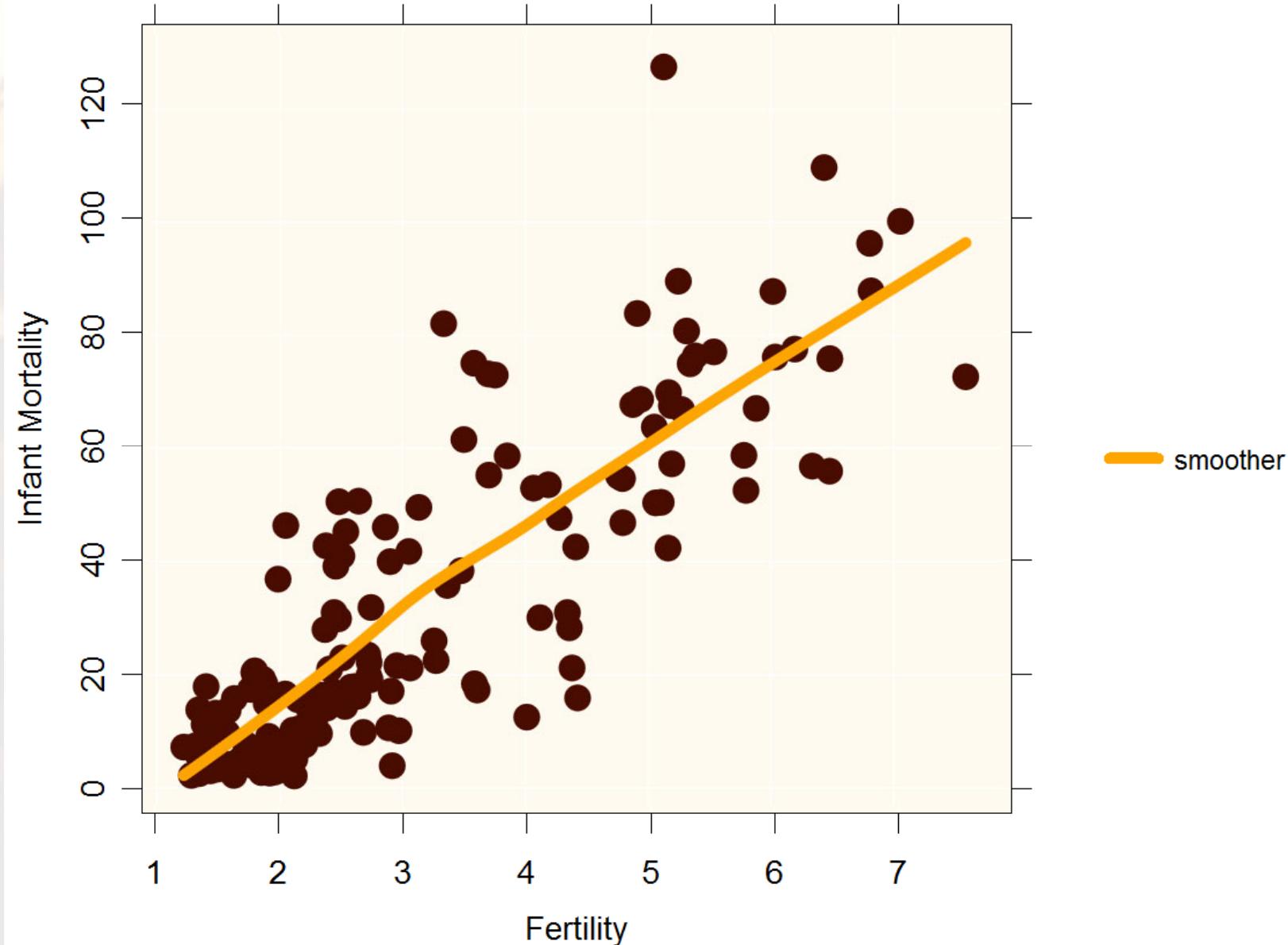
Switching the roles of variables: Switching “X and Y”

Fertility vs Infant Mortality



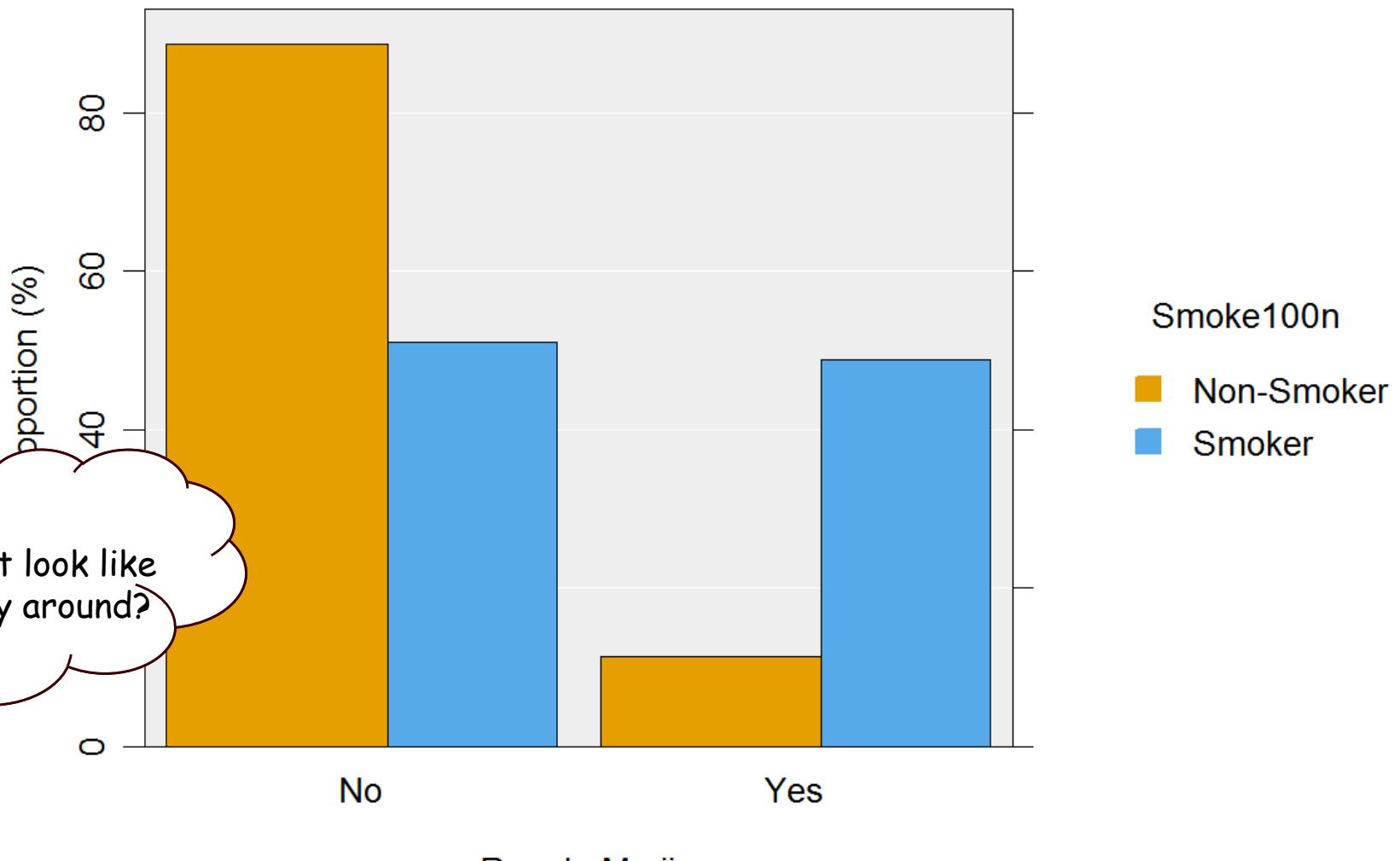
Switching the roles of variables: Switching “X and Y”

Infant Mortality vs Fertility



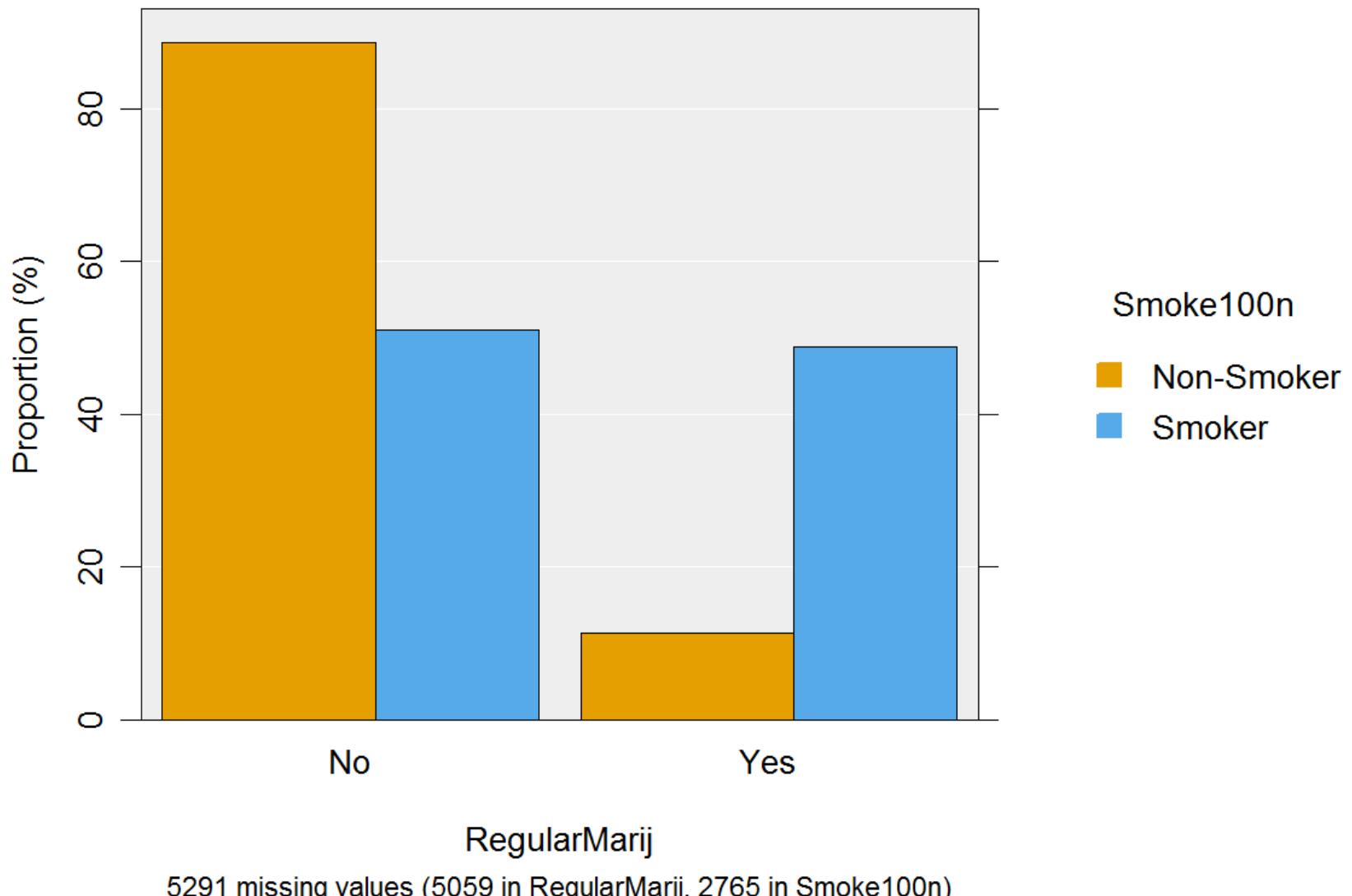
2-way table switching “X and Y”

Distribution of RegularMarij by Smoke100n

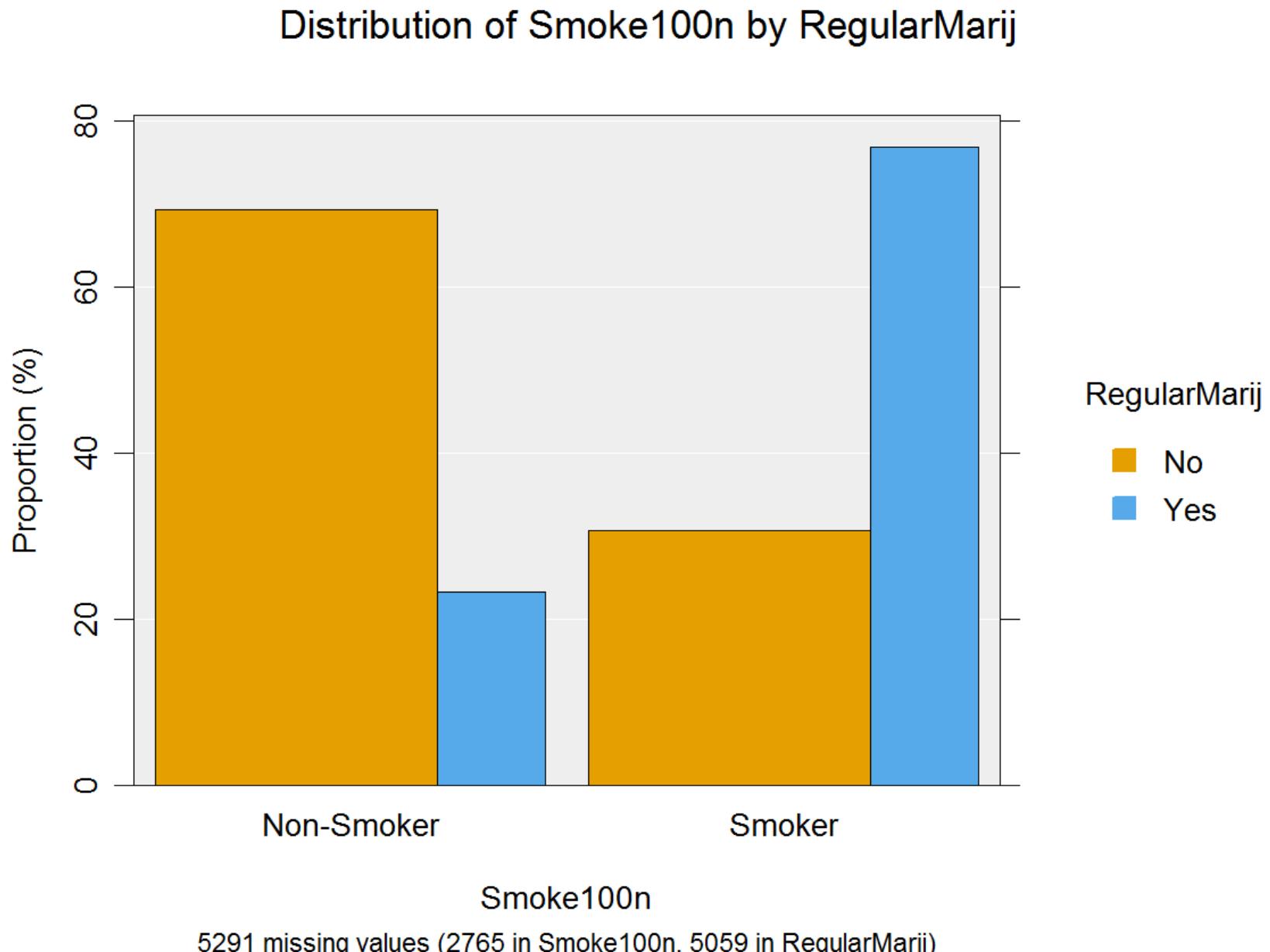


2-way table switching “X and Y”

Distribution of RegularMarij by Smoke100n

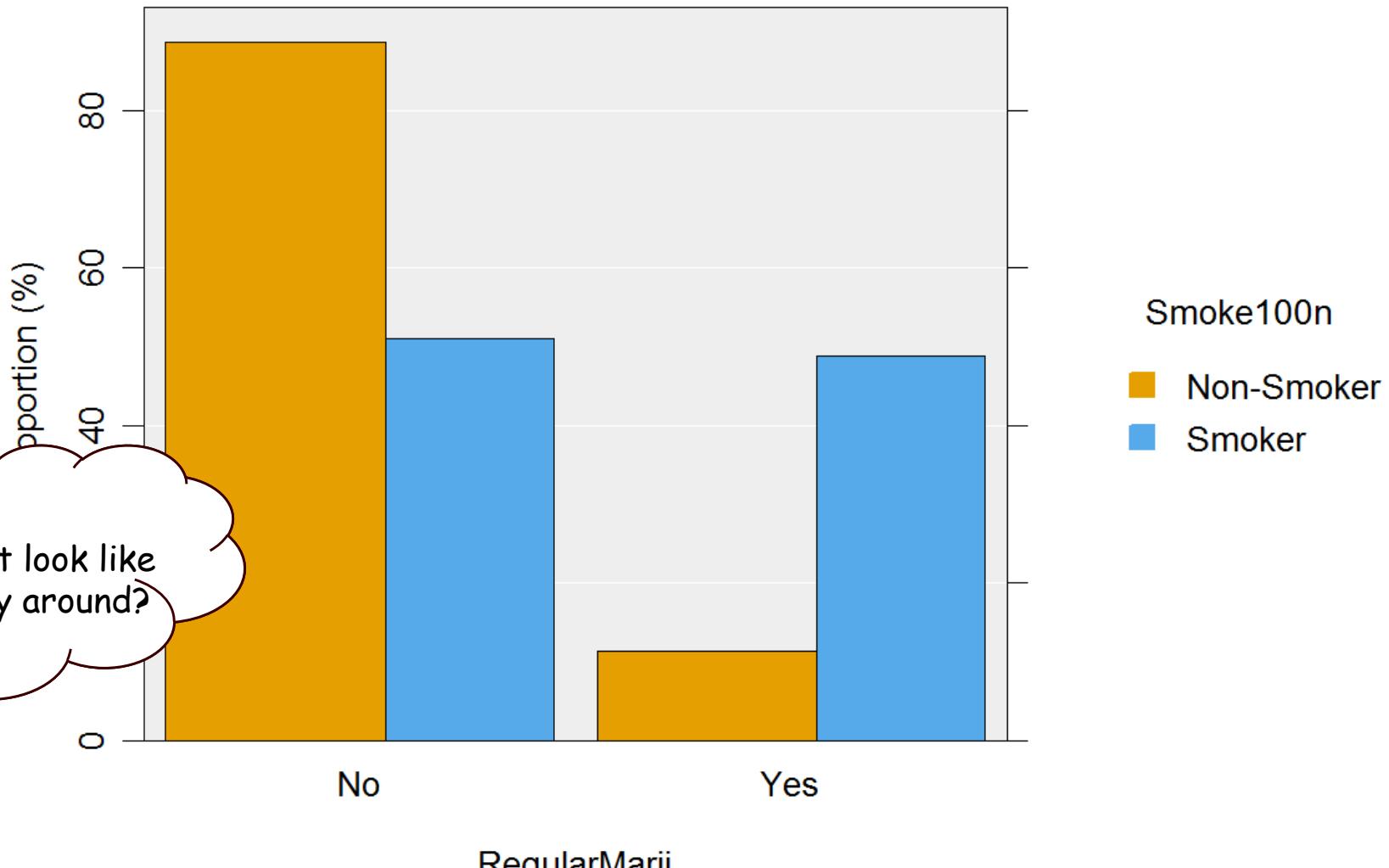


2-way table switching “X and Y”



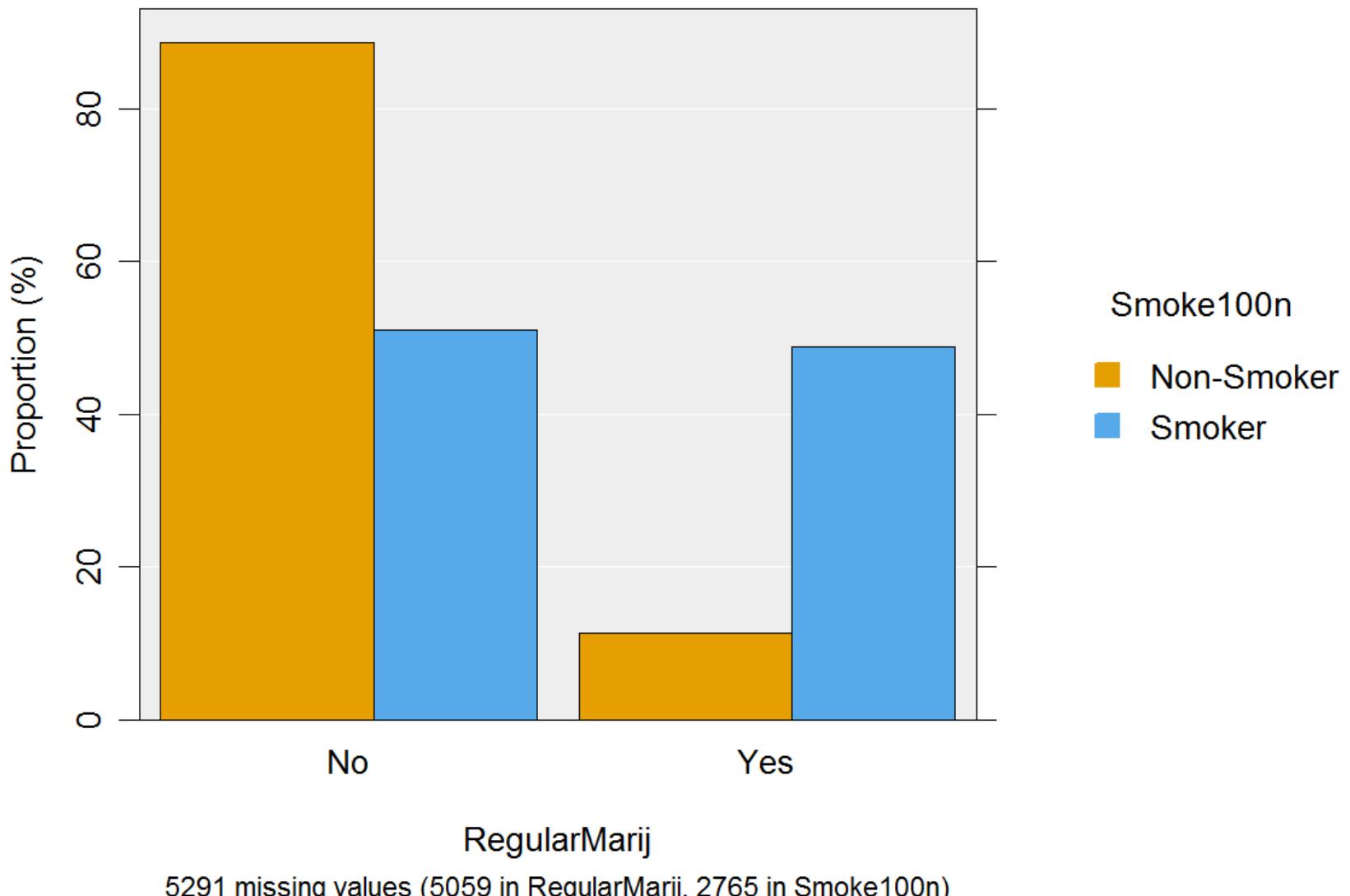
2-way table switching representations

Distribution of RegularMarij by Smoke100n



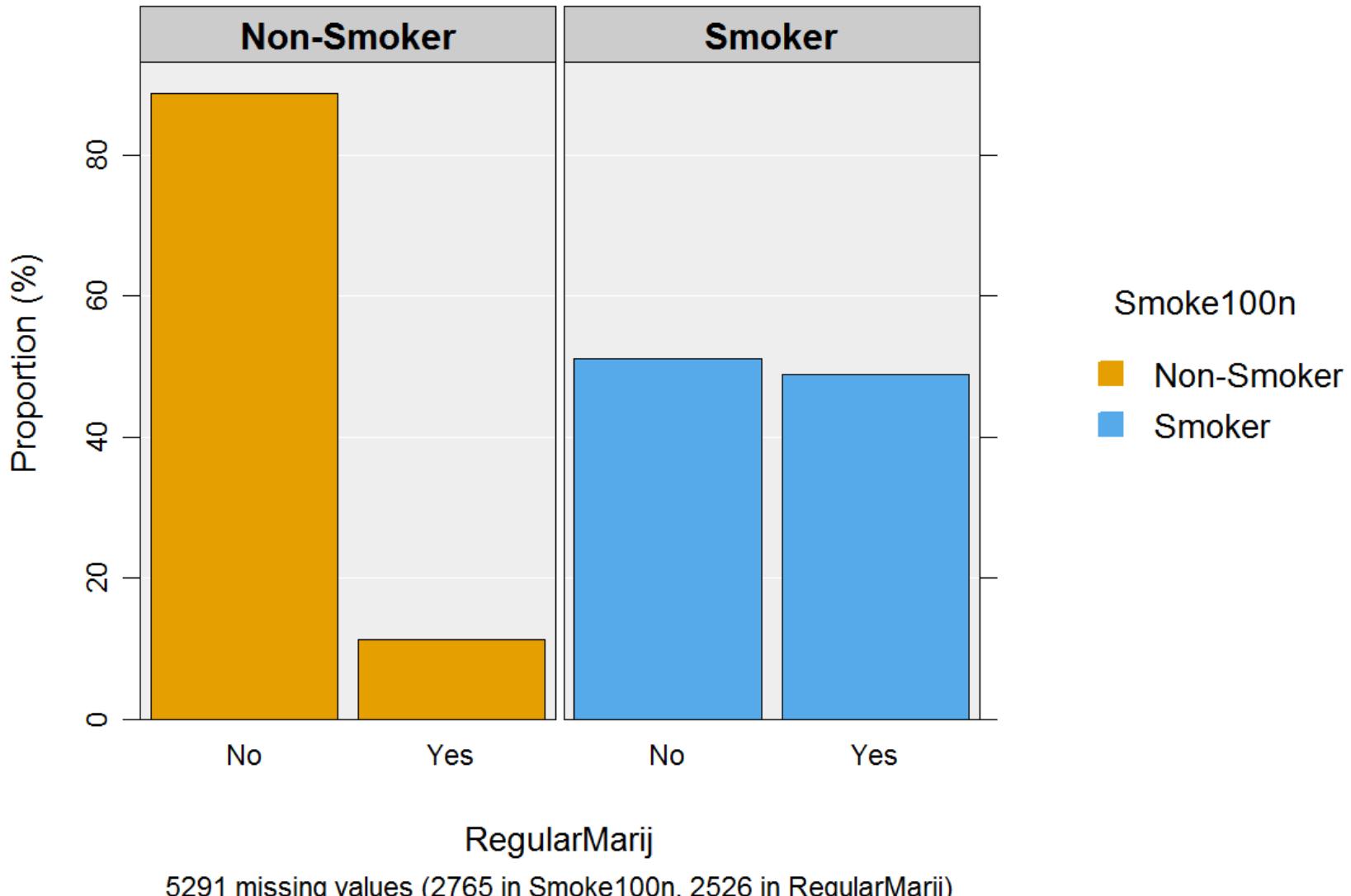
2-way table switching representations

Distribution of RegularMarij by Smoke100n



2-way table switching representations

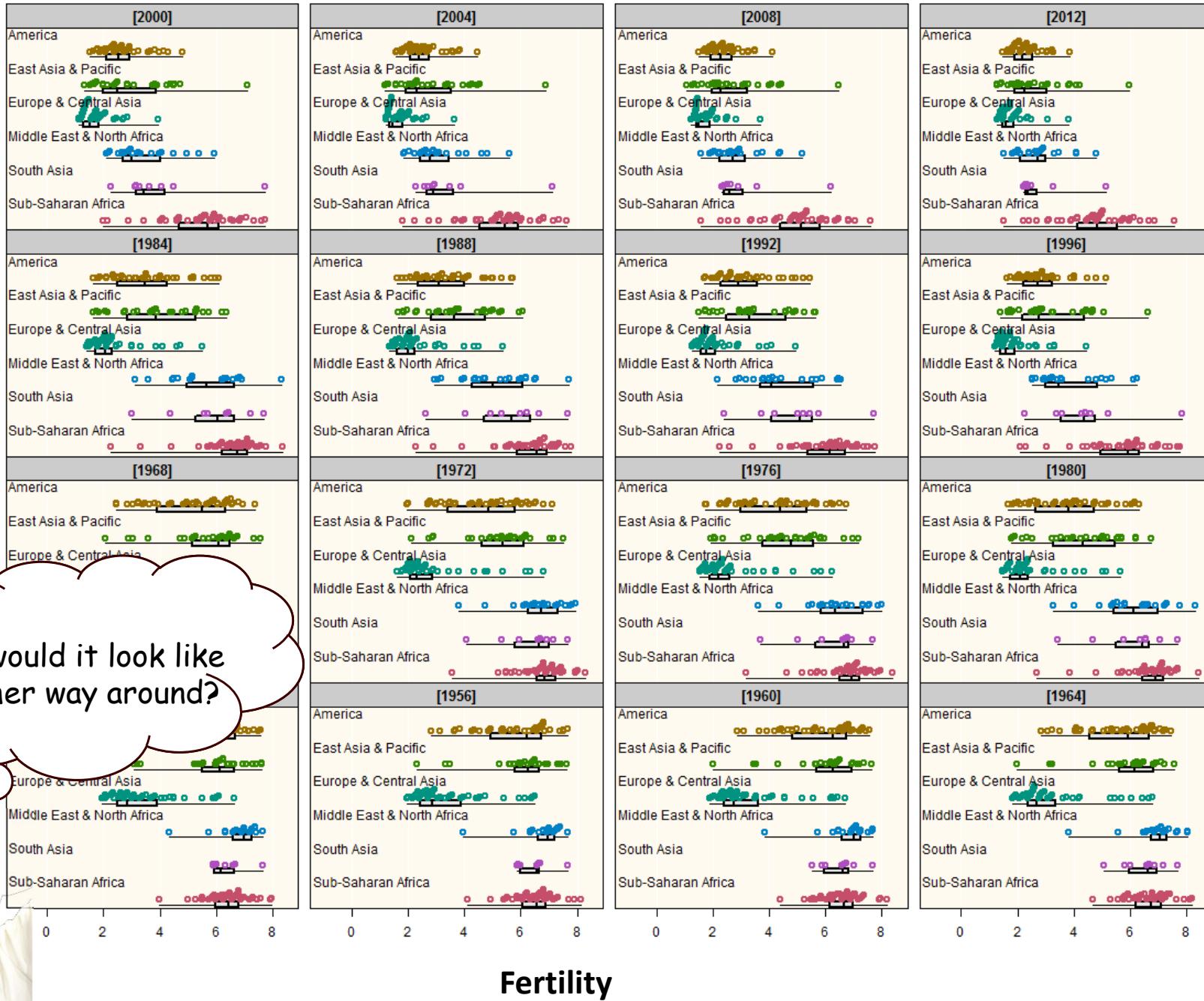
Distribution of RegularMarij subset by Smoke100n



Fertility by Region subset by Year

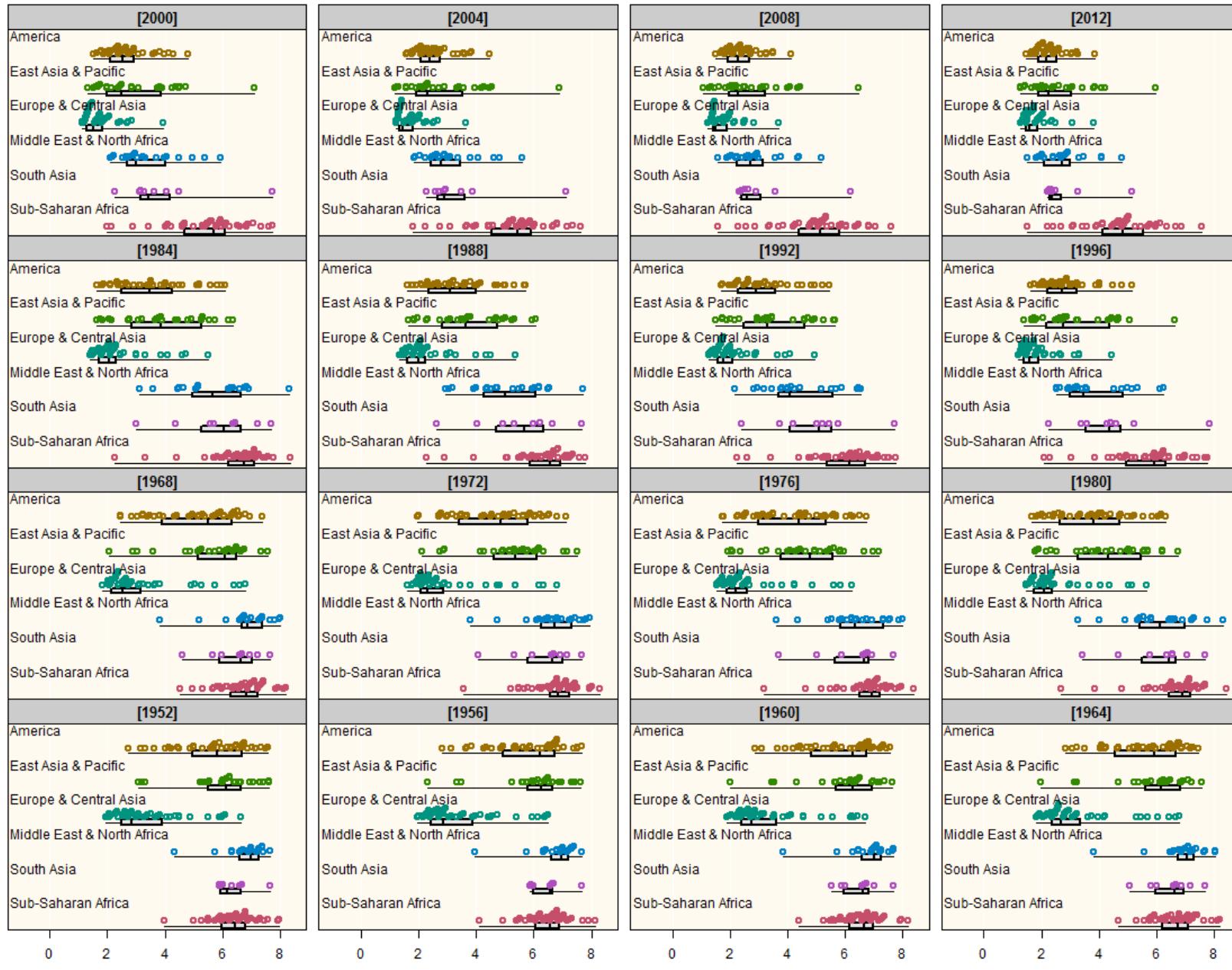
Region

What would it look like
the other way around?



Fertility by Region *subset* by Year

Region

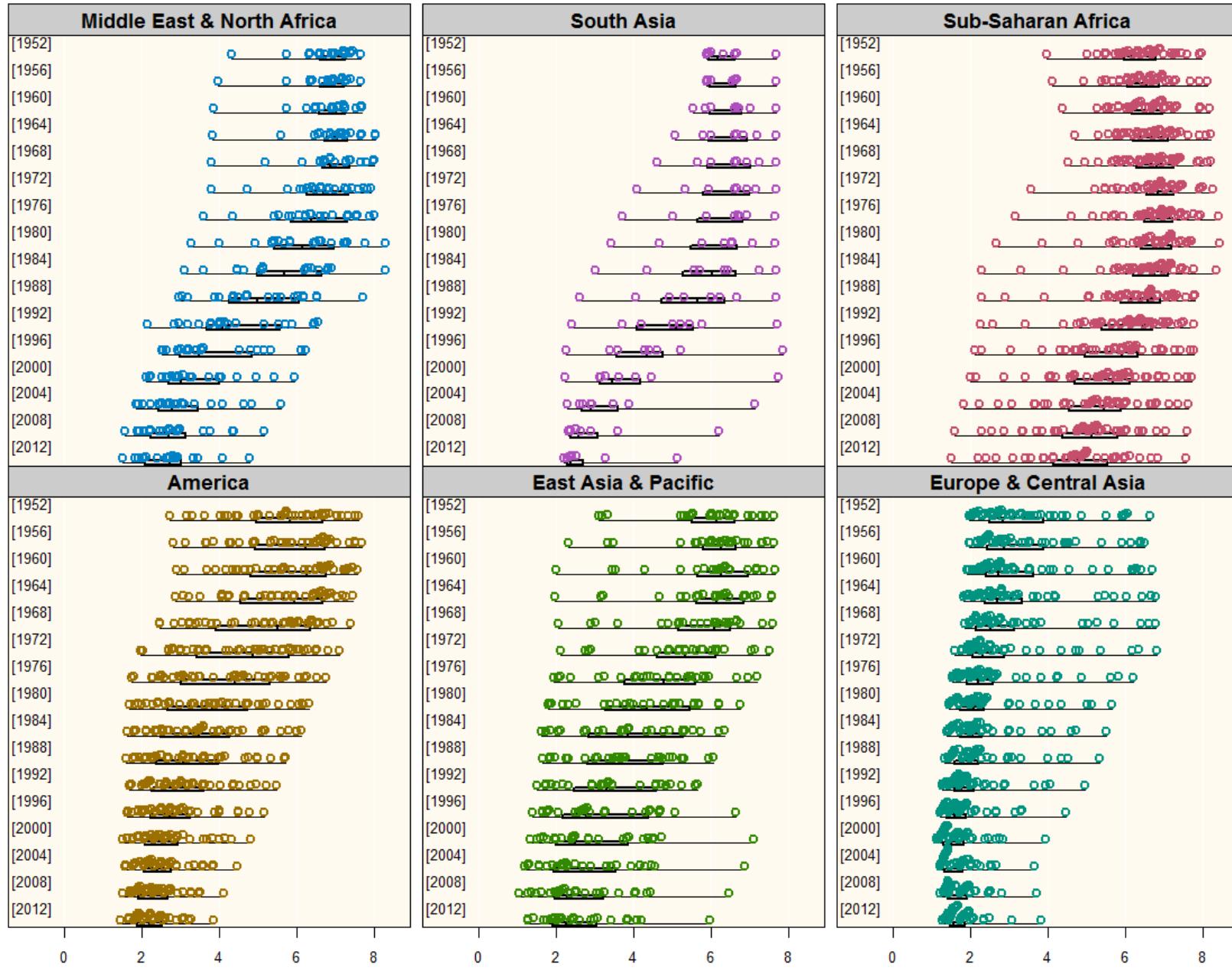


Fertility



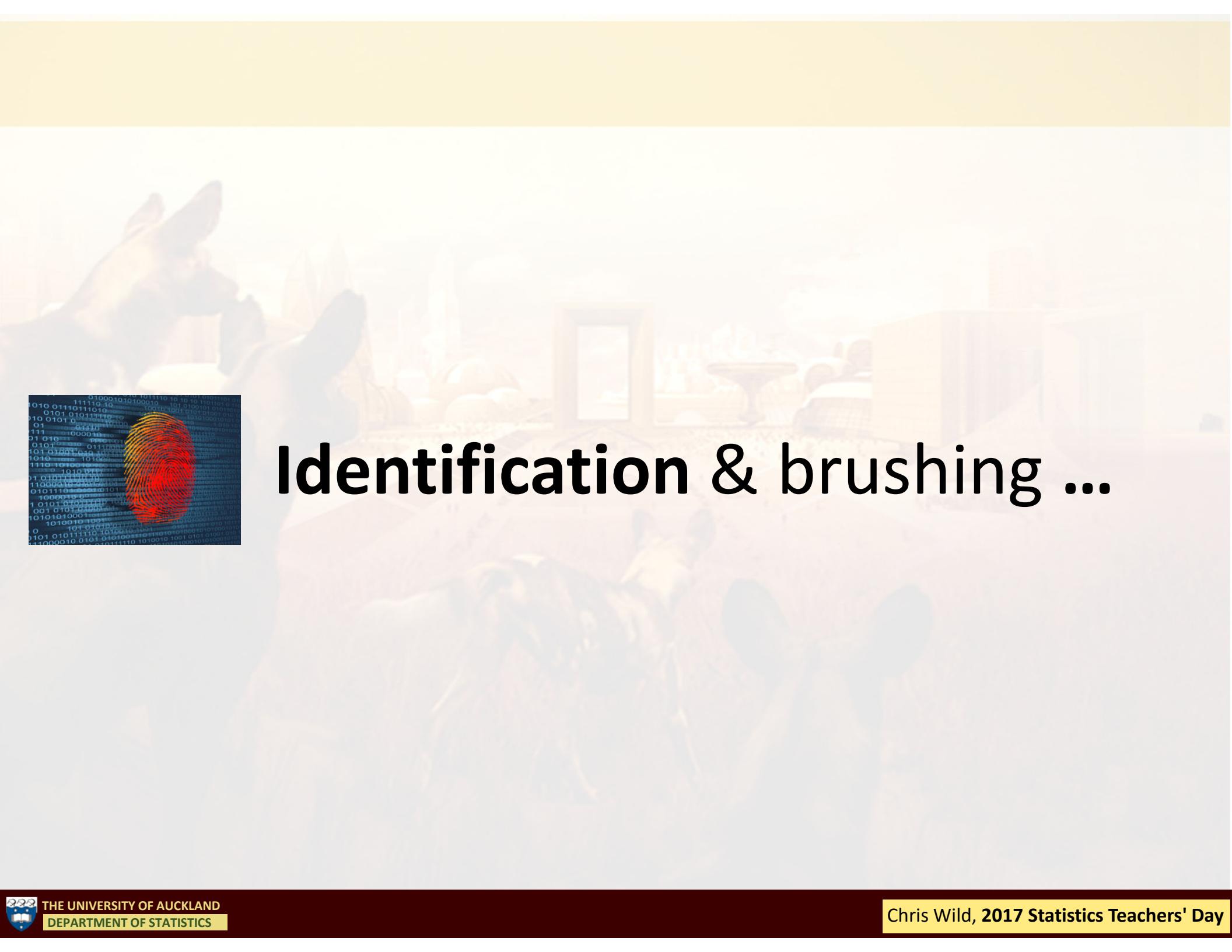
Fertility by Year *subset* by Region

Year



Fertility

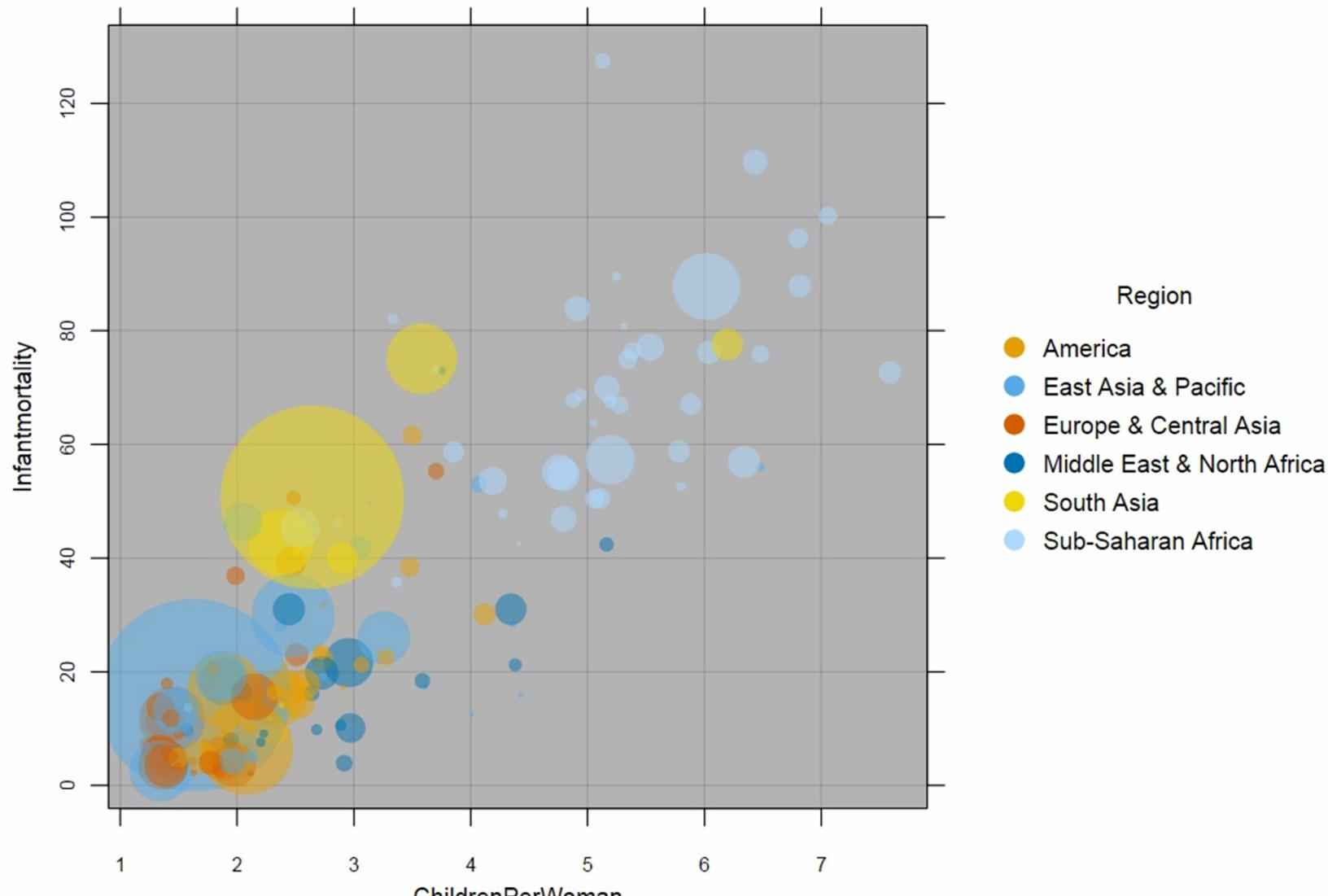




Identification & brushing ...



Infantmortality versus ChildrenPerWoman (size proportional to Populationtotal)



Reset

View Table

Variables to display

Display all

Country
ChildrenPerWoman
Infantmortality
Populationtotal



Distribution of cellsource by gender

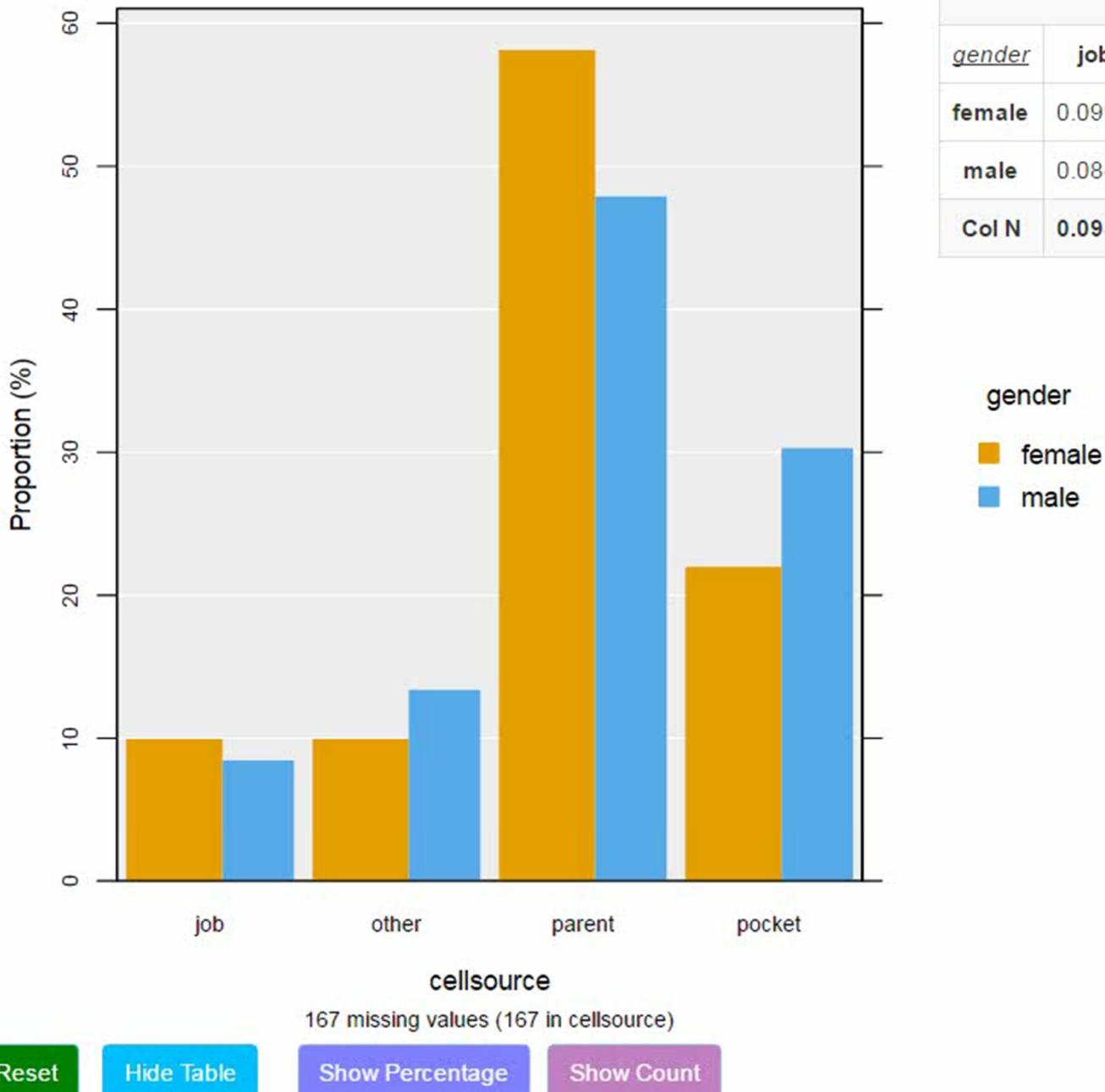


Table of Counts and Proportions

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

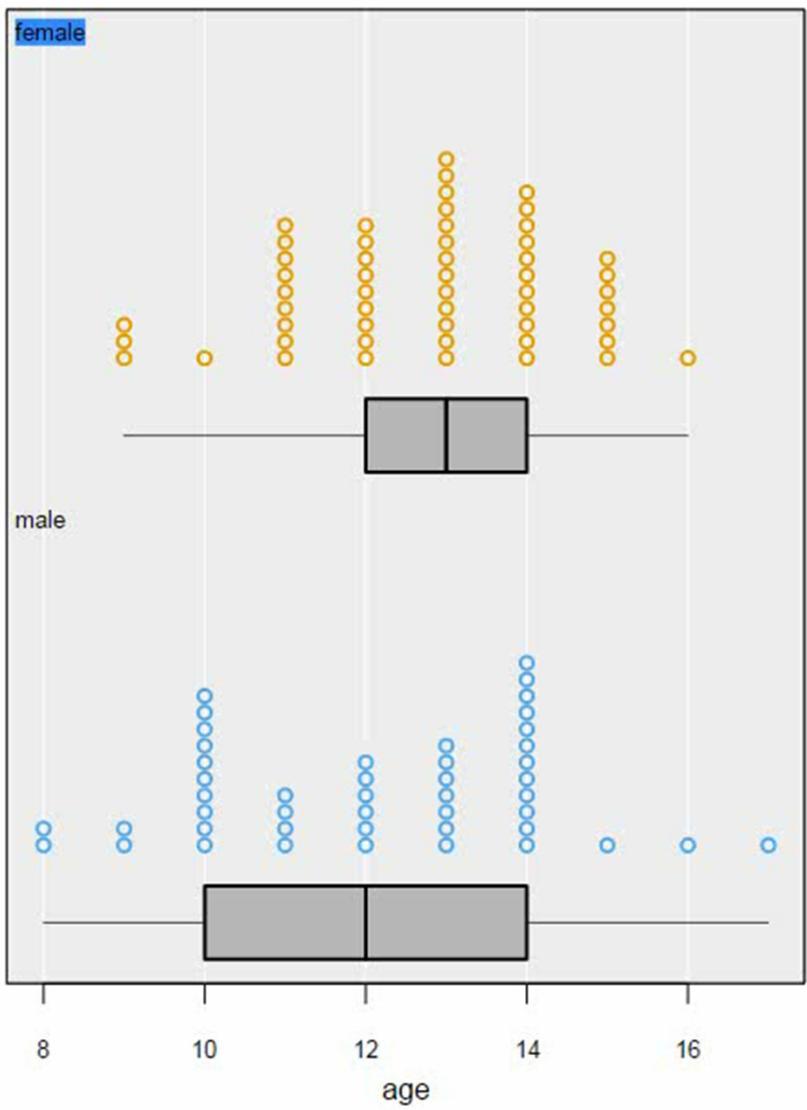
gender

- female
- male



age by gender

gender



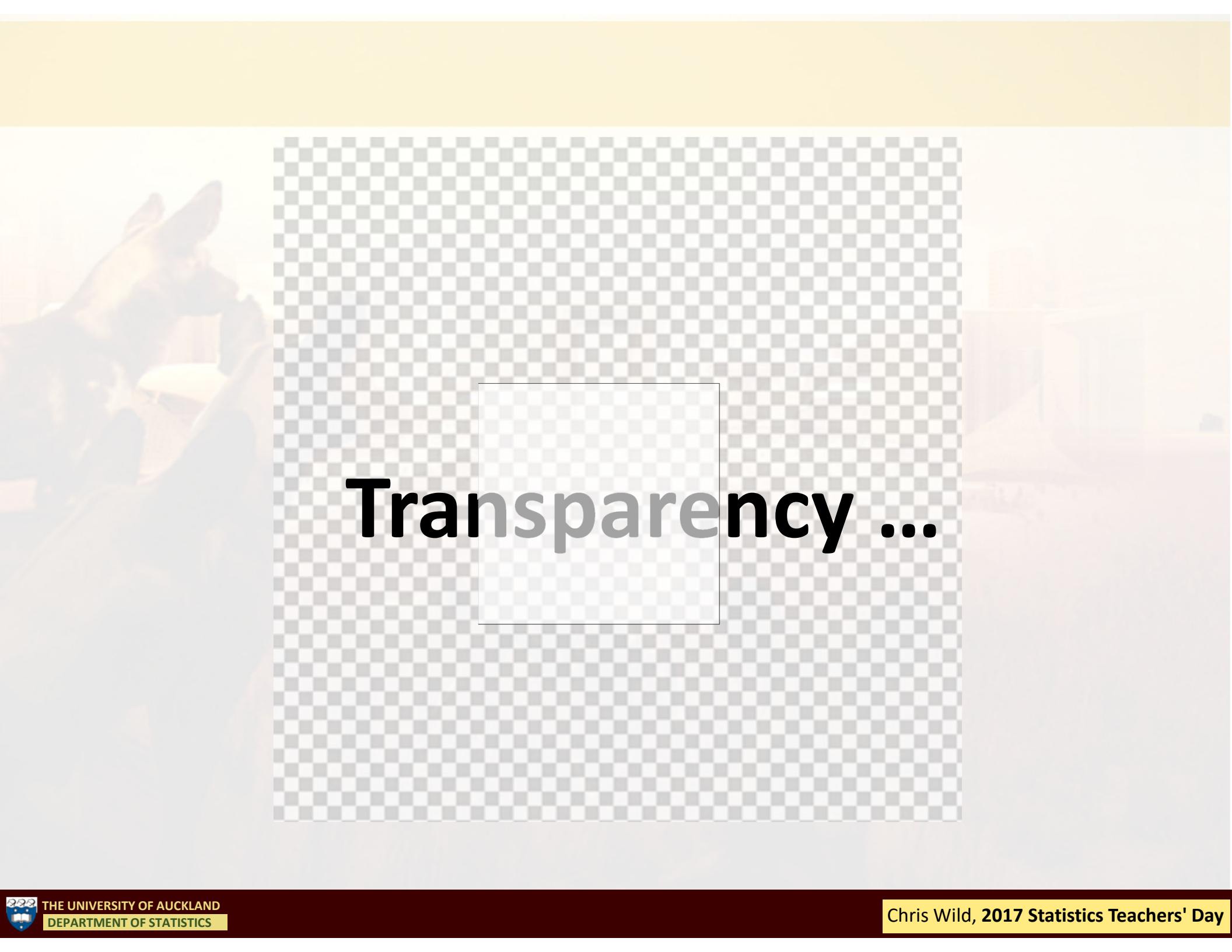
Reset

Hide Table

Display all
age
gender

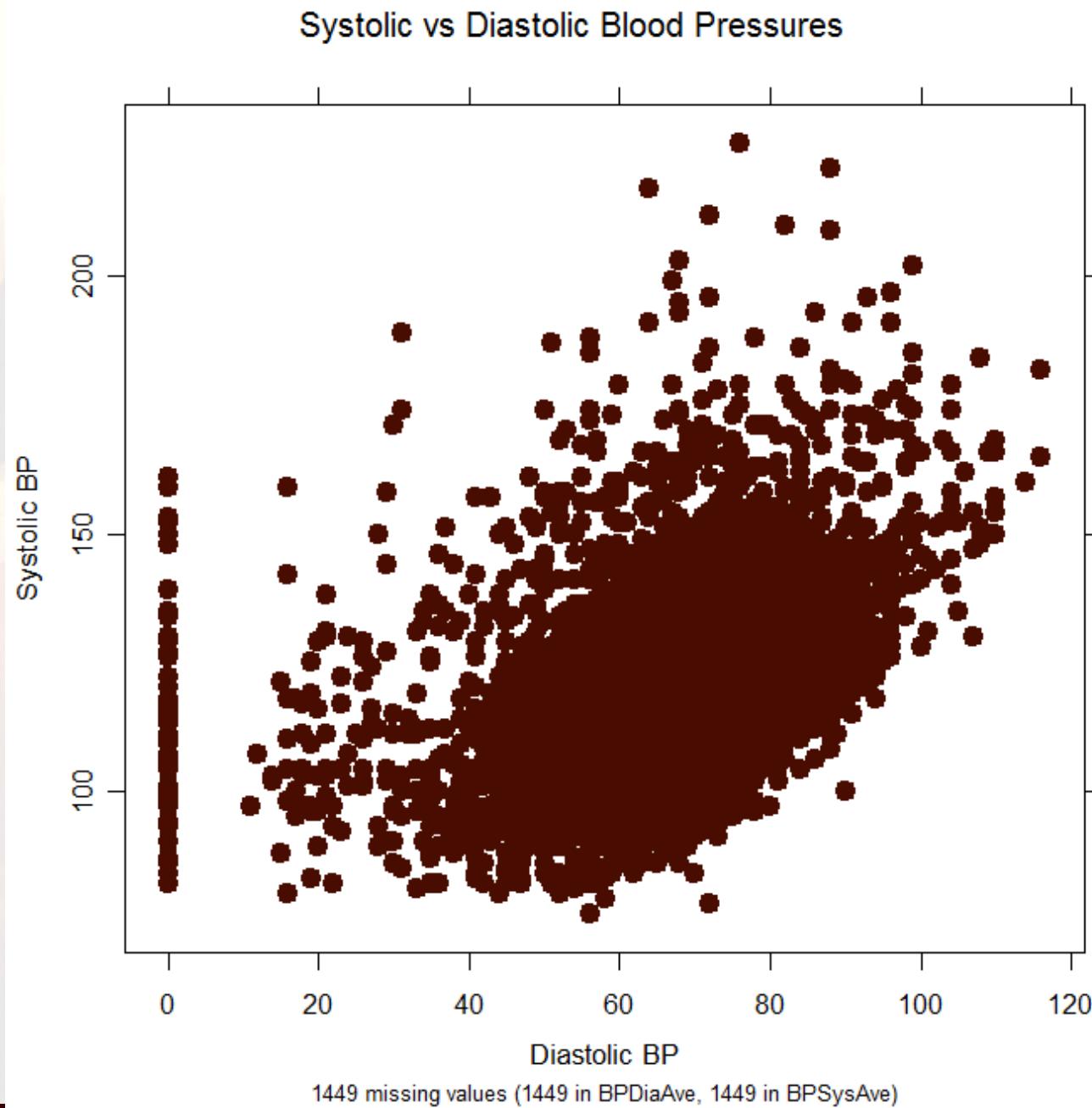
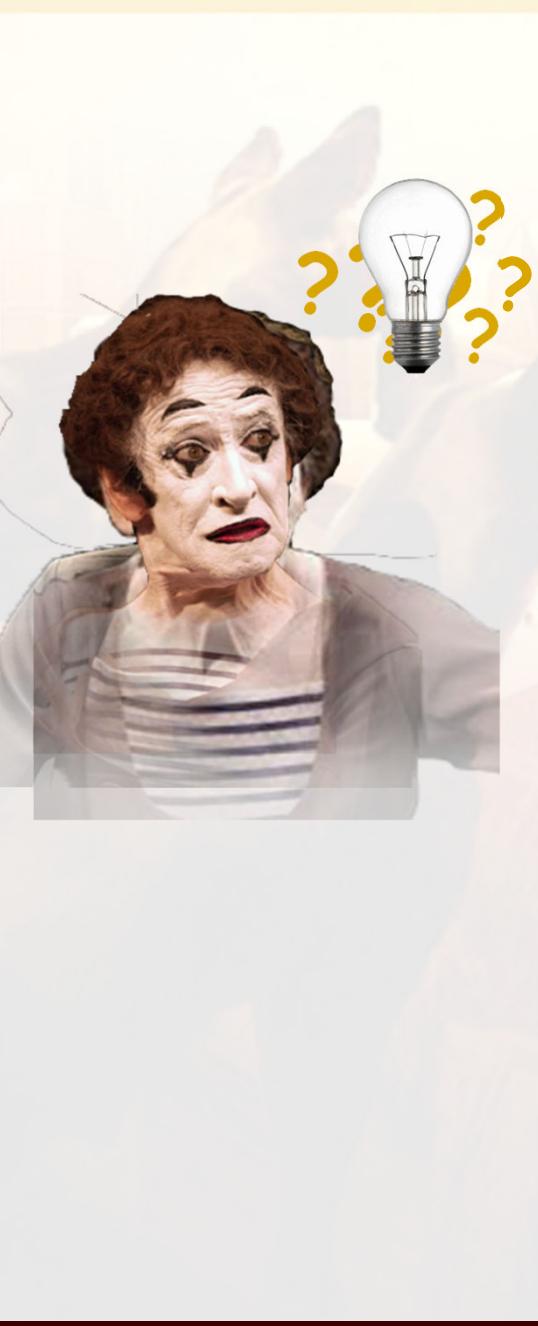
Data

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

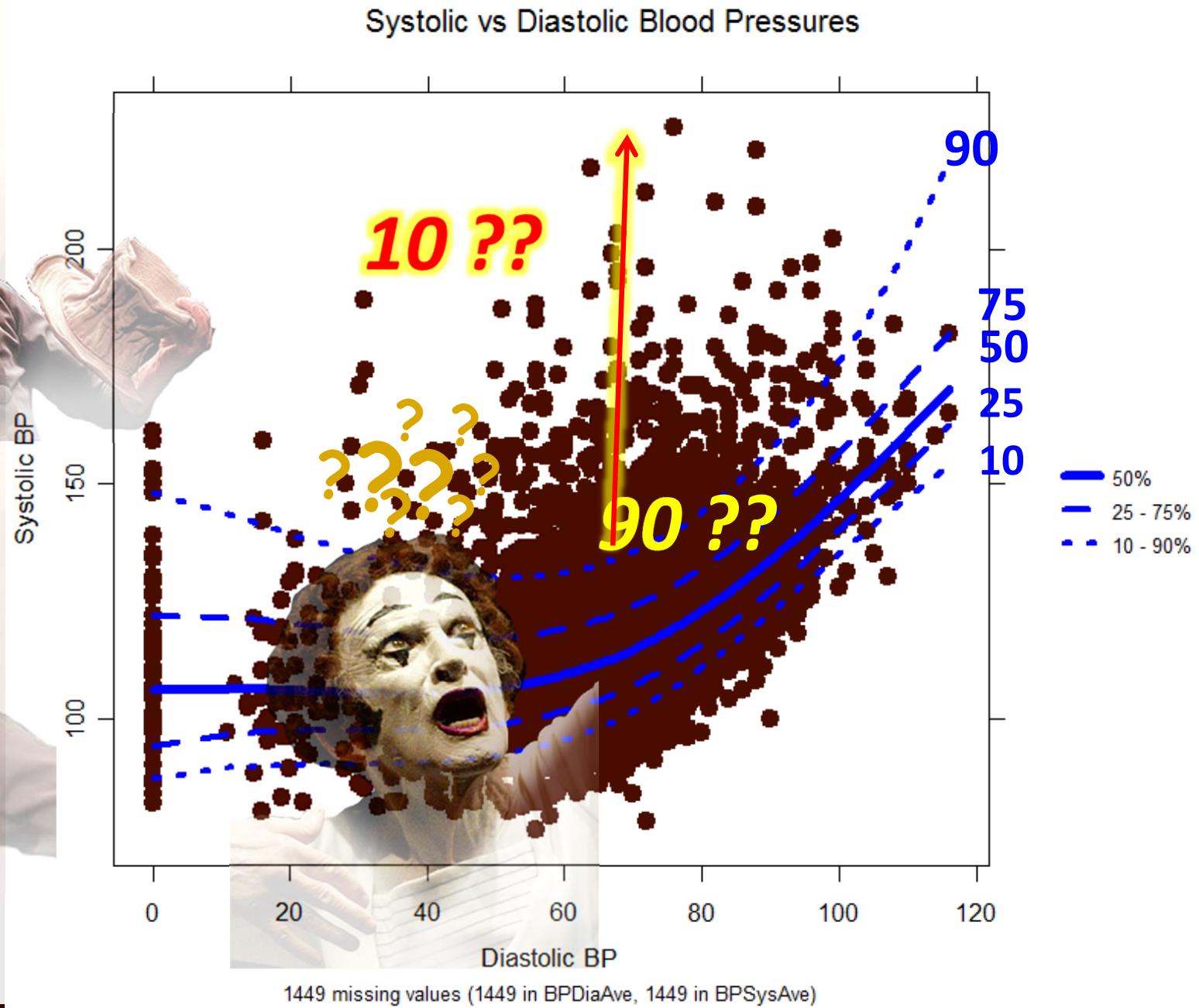


Transparency ...

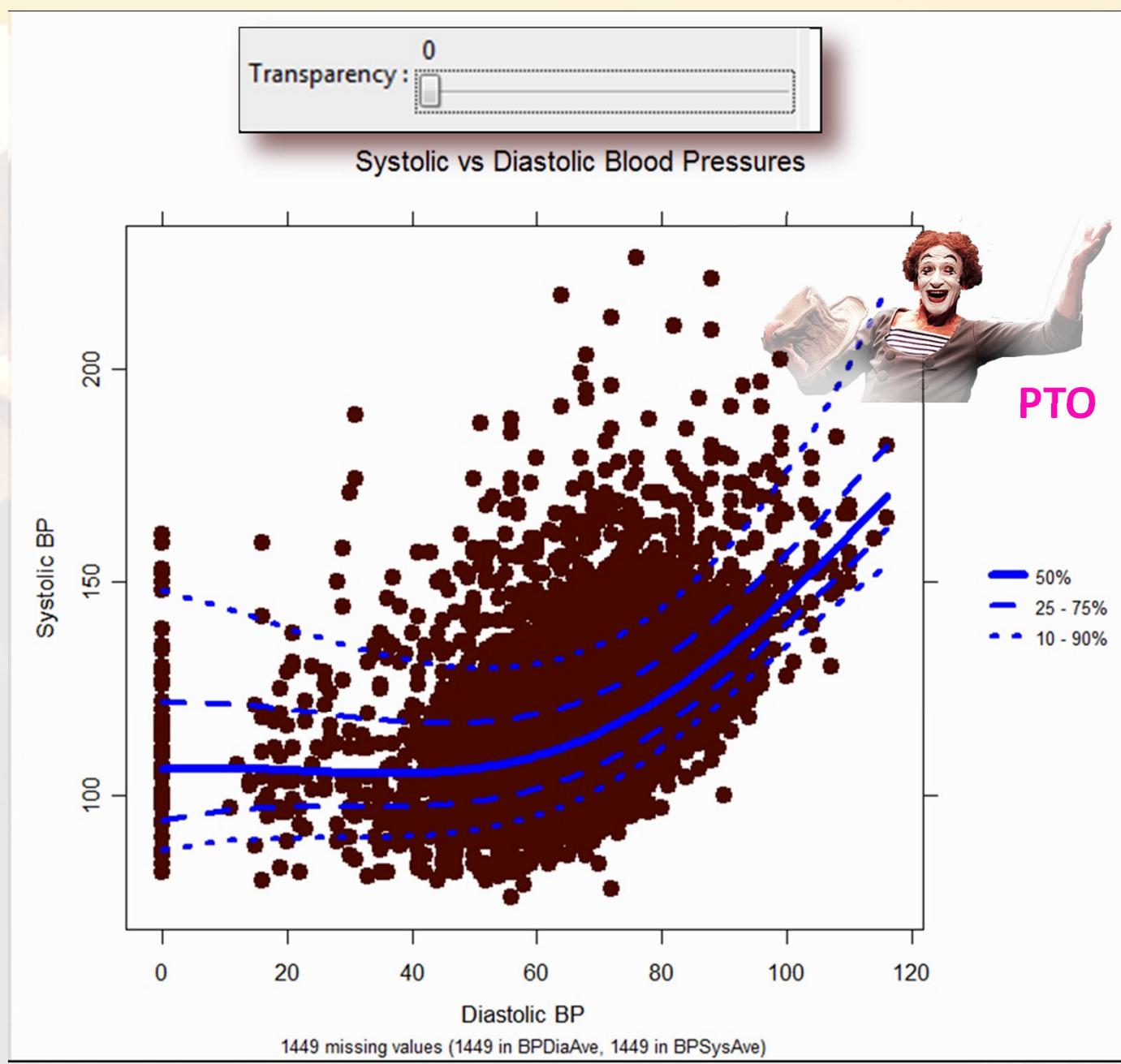
Blood pressures for 10,000 people



Blood Pressures for 10,000 people

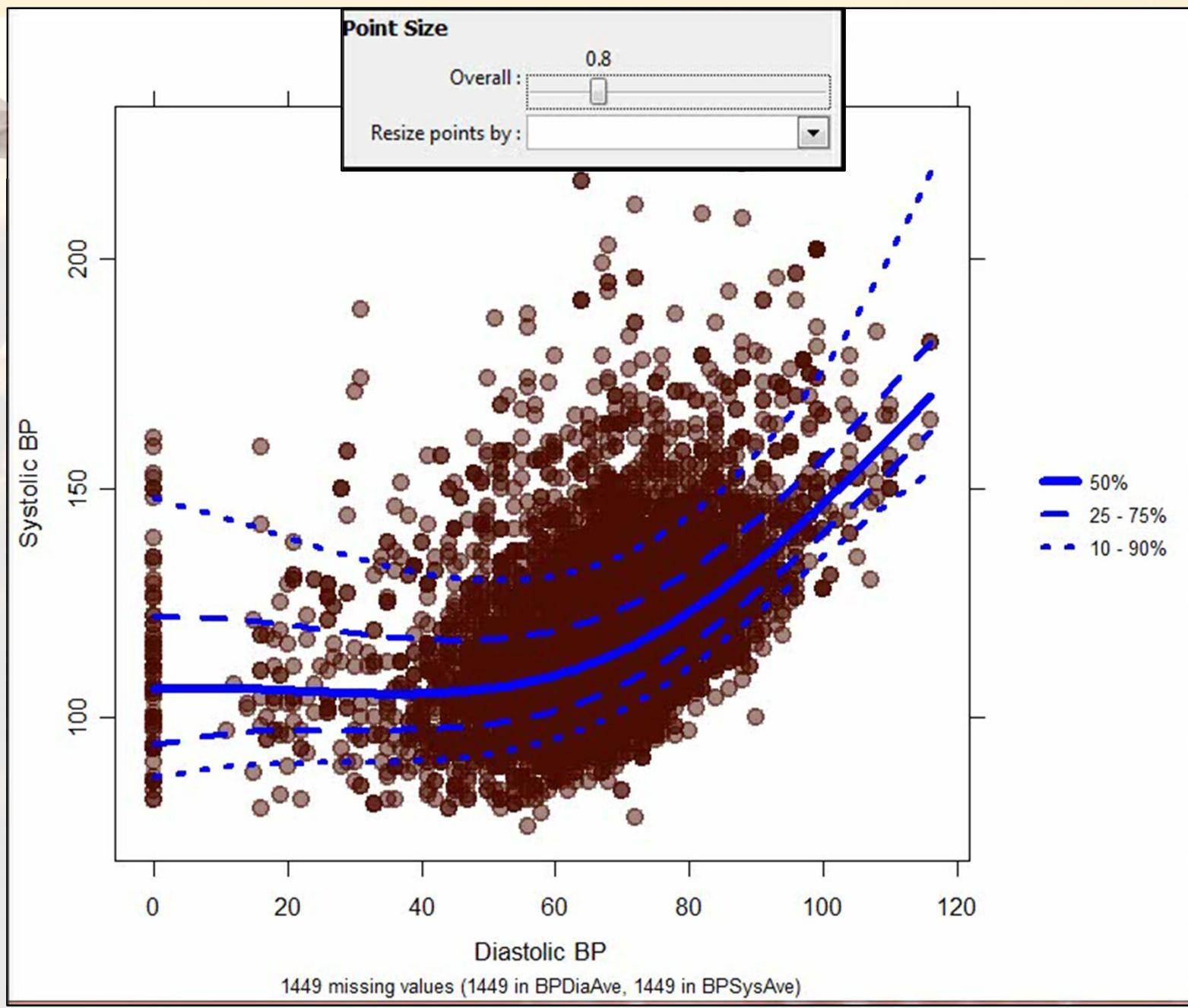


Transparency



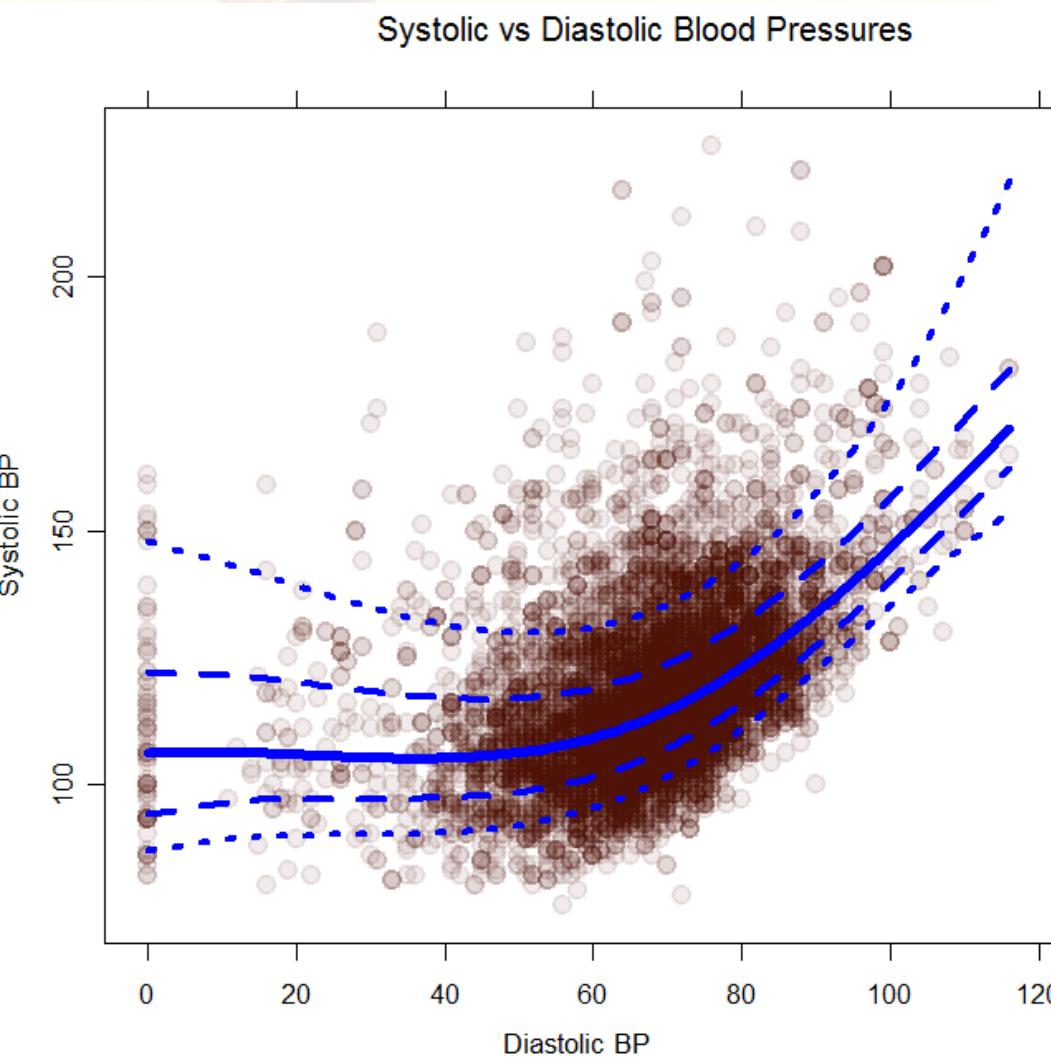


Reducing Point Size

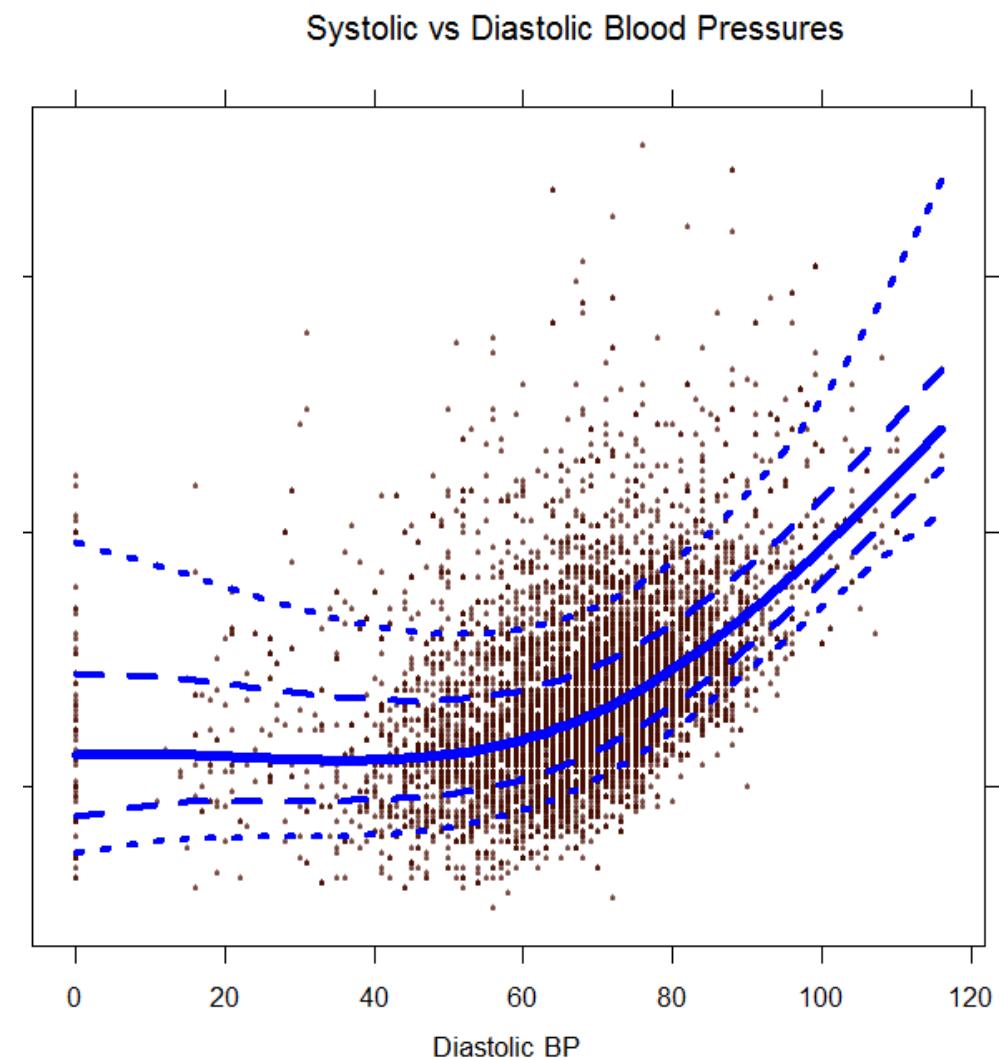


Emphasizing ...

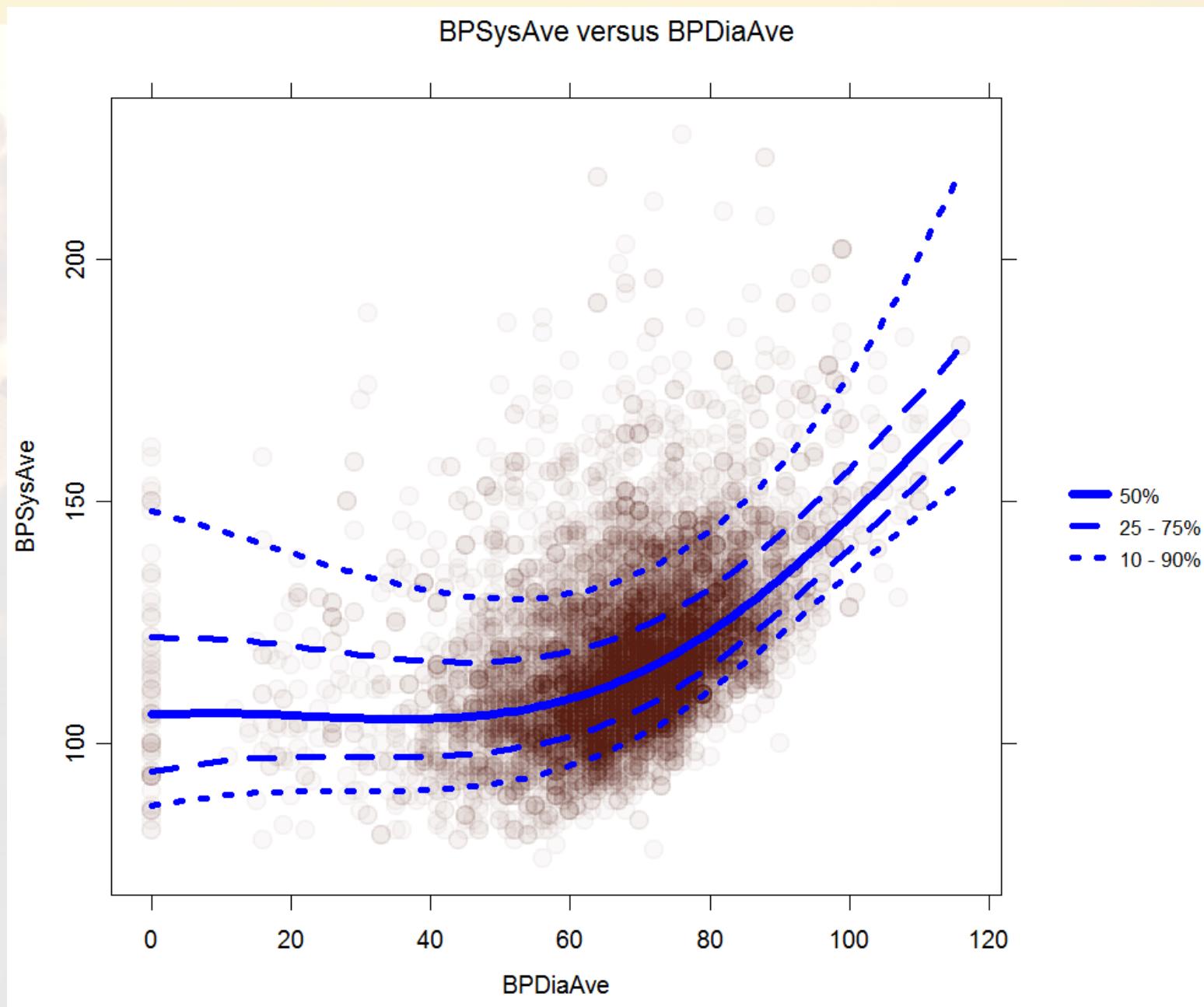
Density



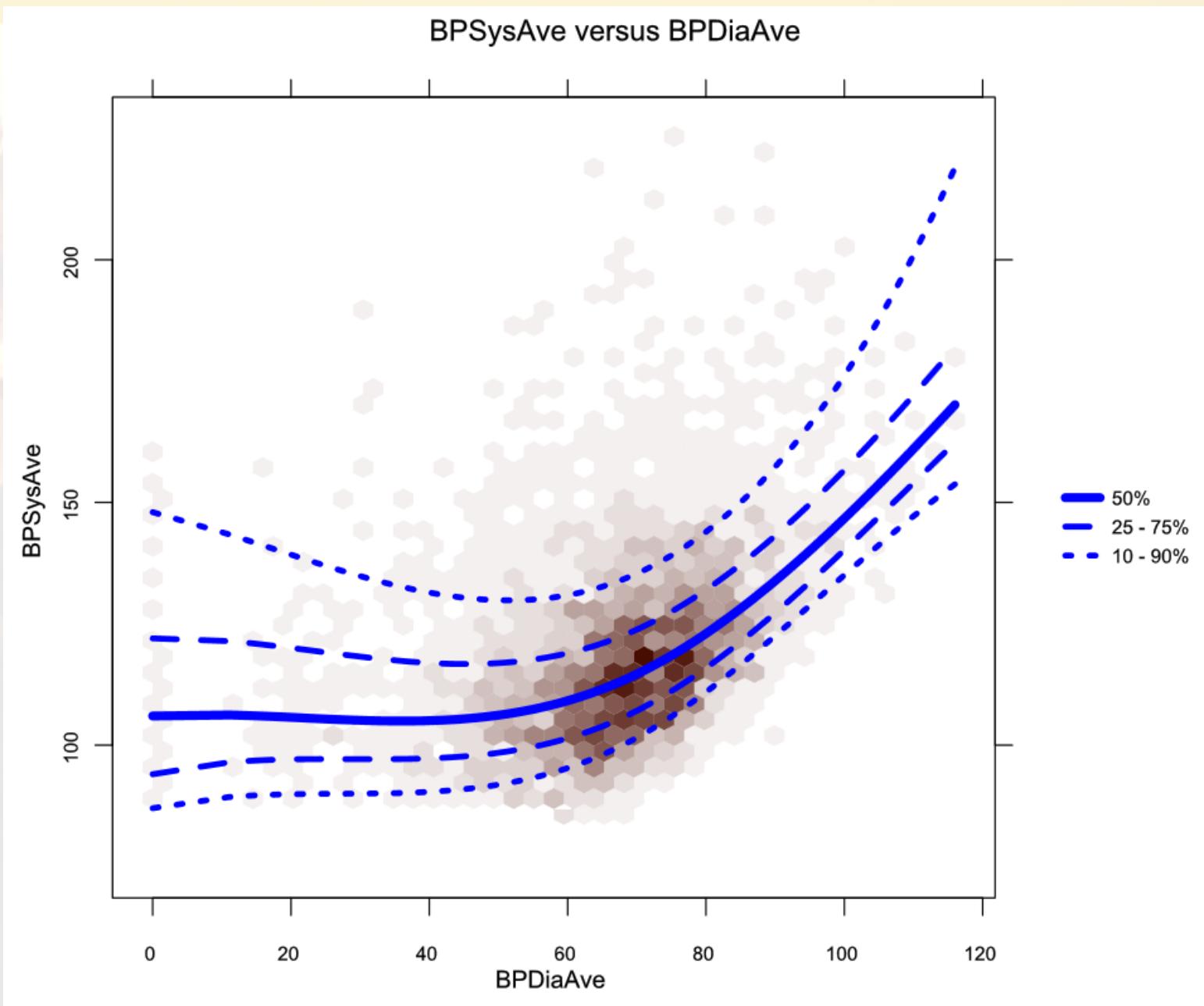
Discreteness



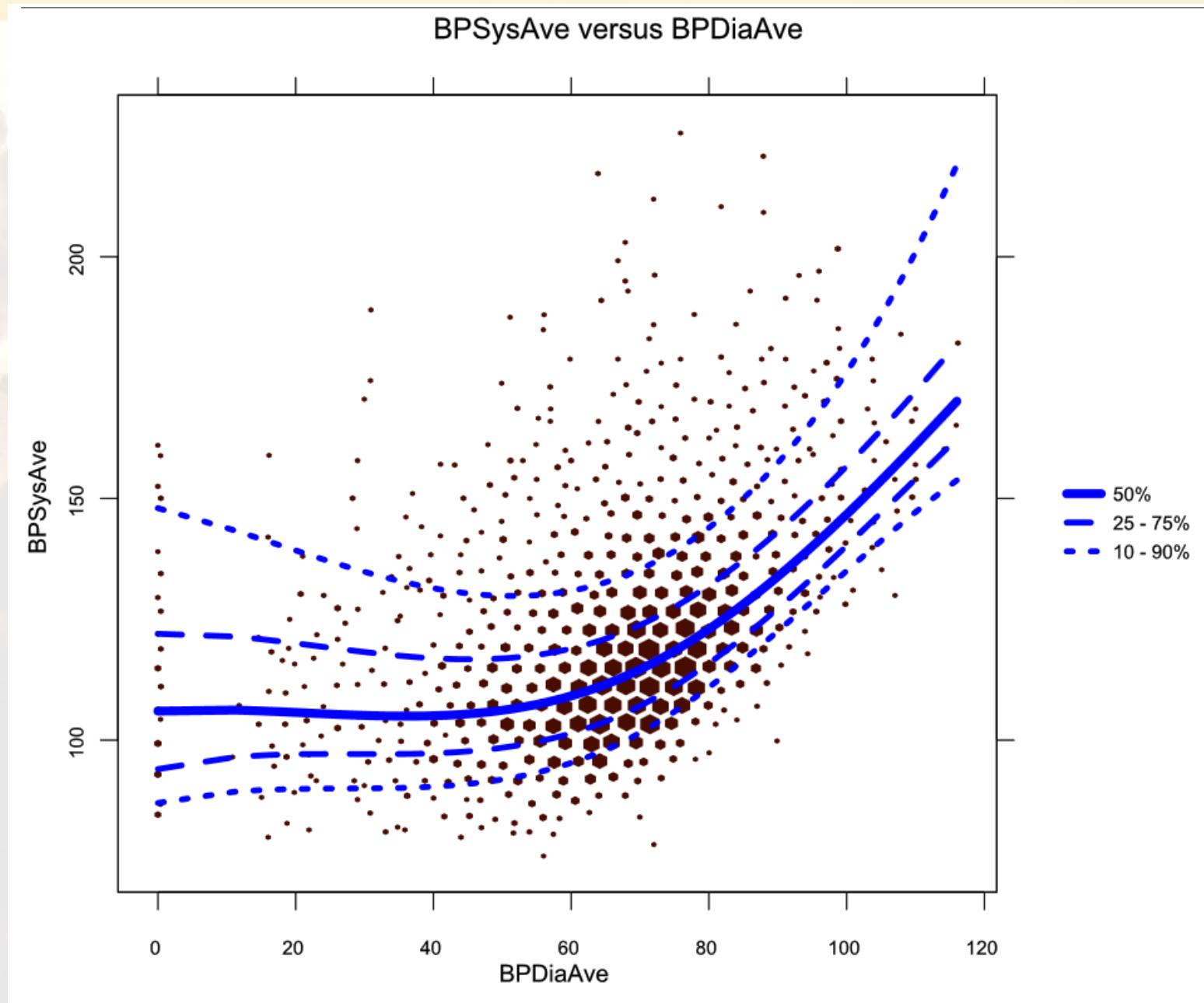
Scatter plot with transparency

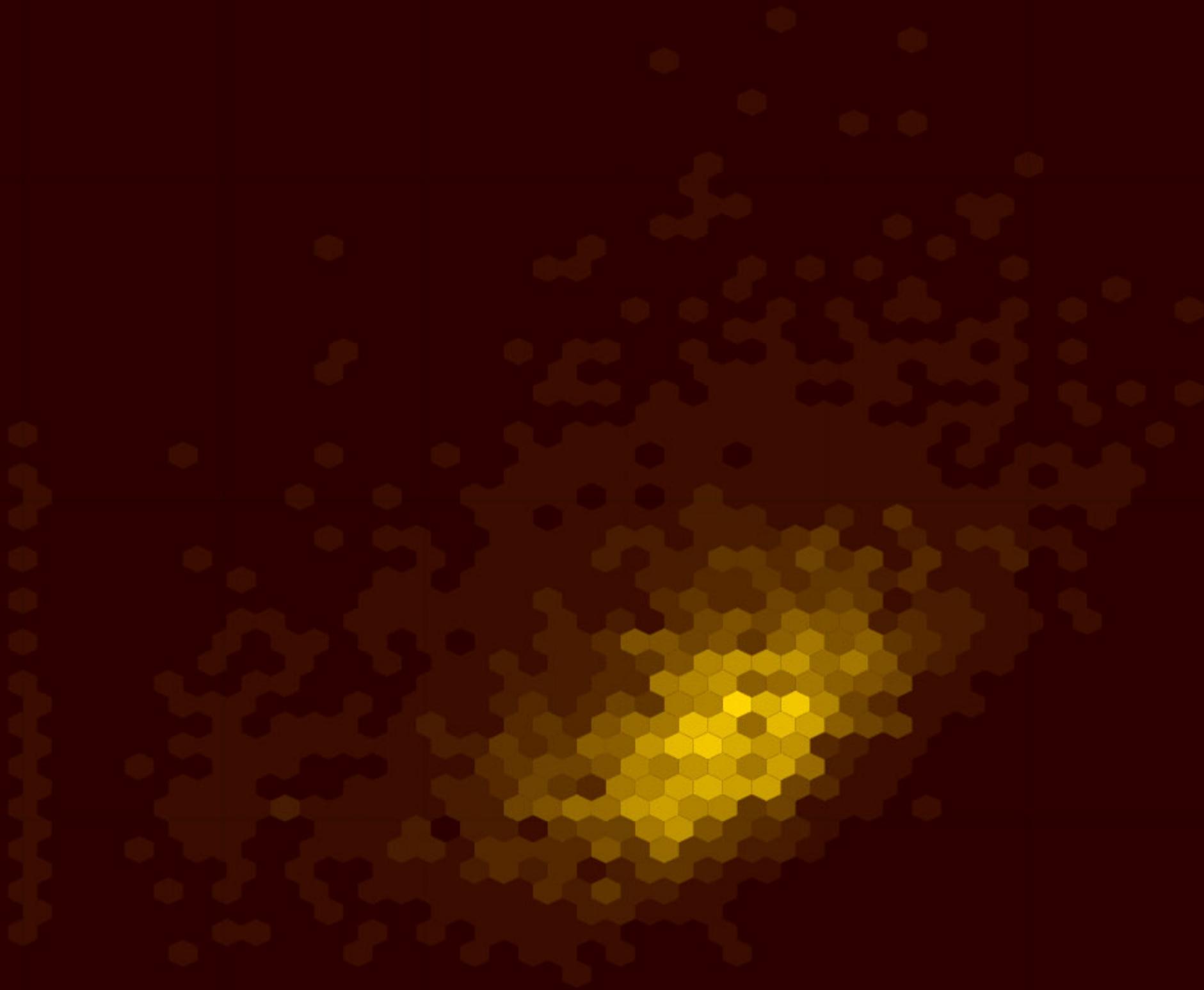


“Big data” version ... *Hexbin* (*alpha*)



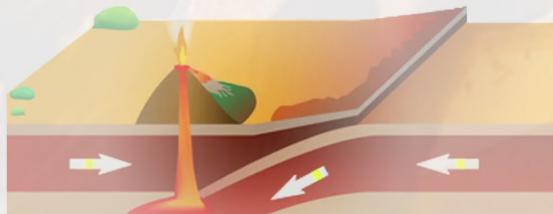
“Big data” version ... *Hexbin* (size)





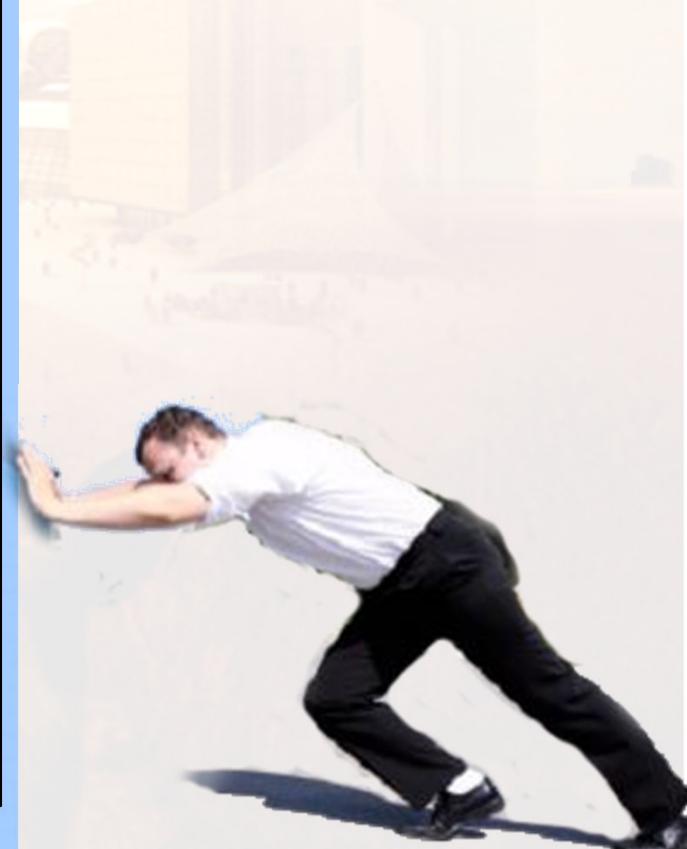
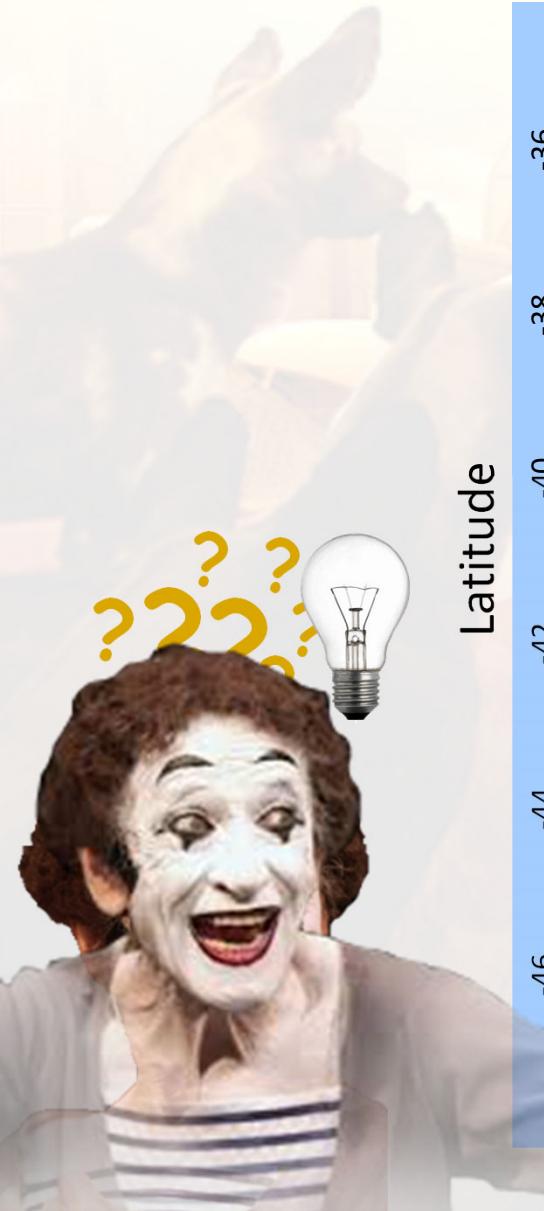
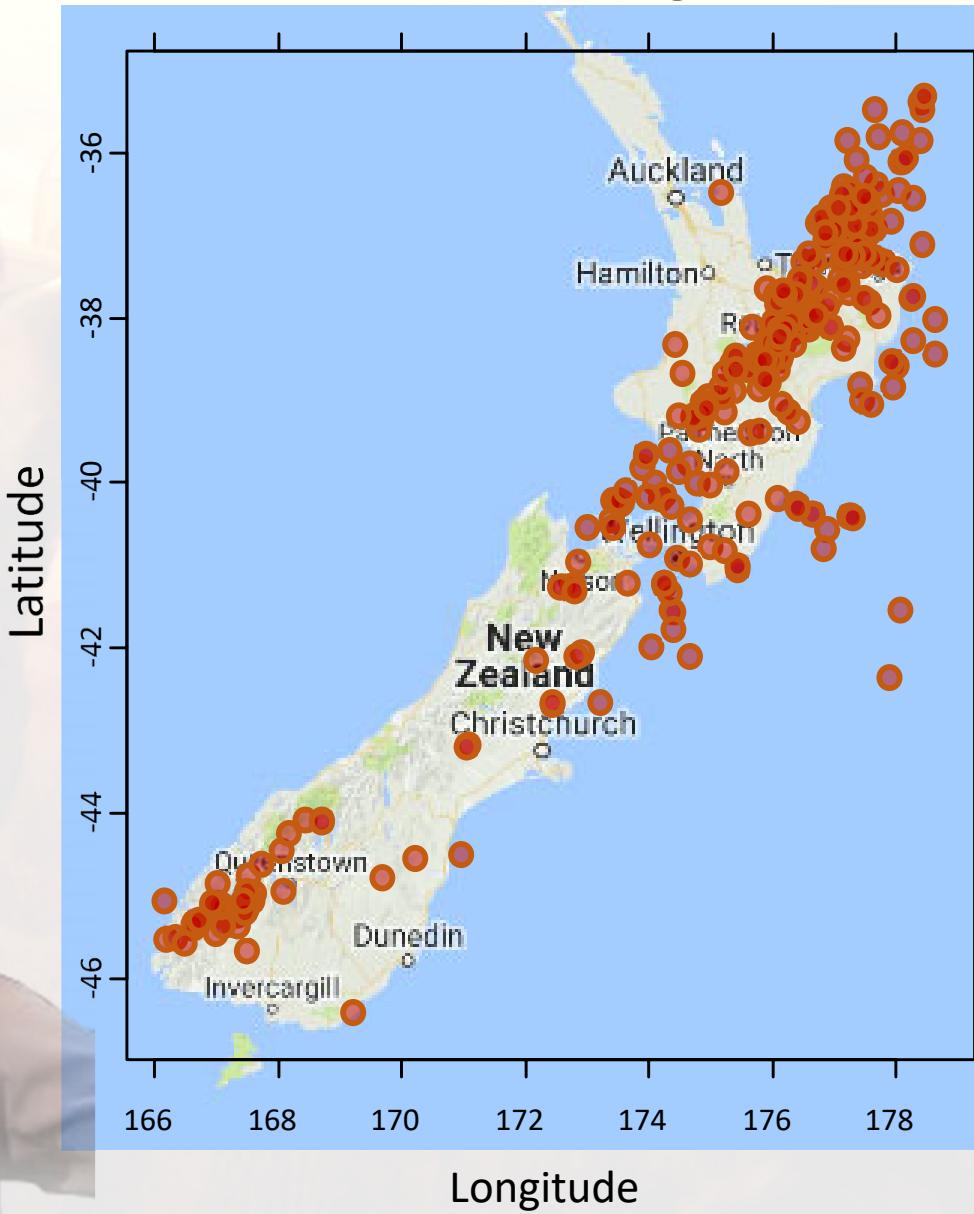


Earthquakes ...

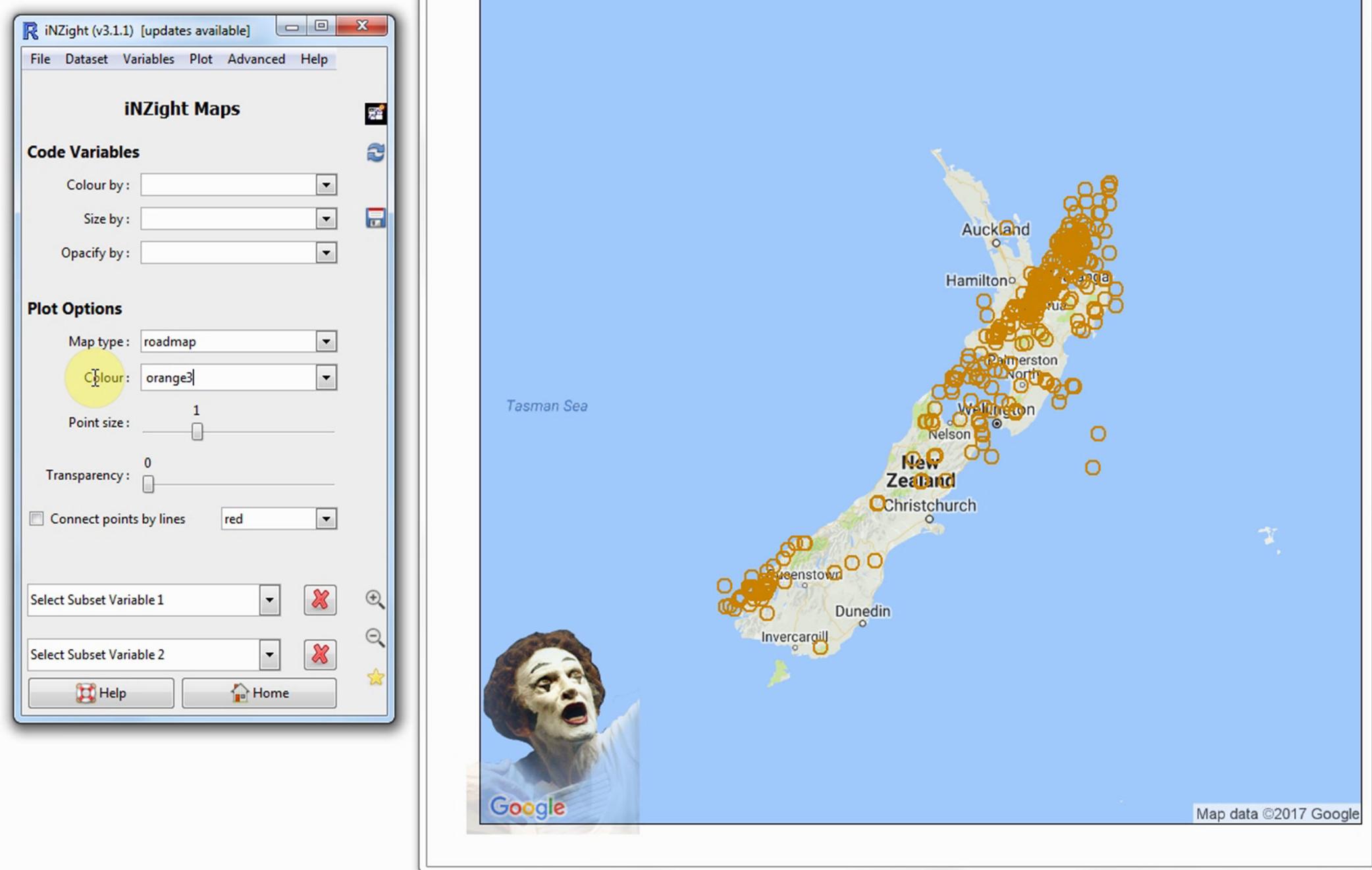


New Zealand Earthquakes (in 2000)

Latitude versus Longitude



Locations of Earthquakes

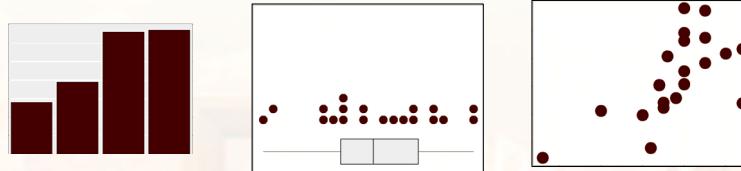


Today's cooking demonstration



RAW INGREDIENTS

- Bar charts
- Dot plots
- Scatter plots



ADDED SPICES

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



MAGIC SUPER SPICE

- Stepping



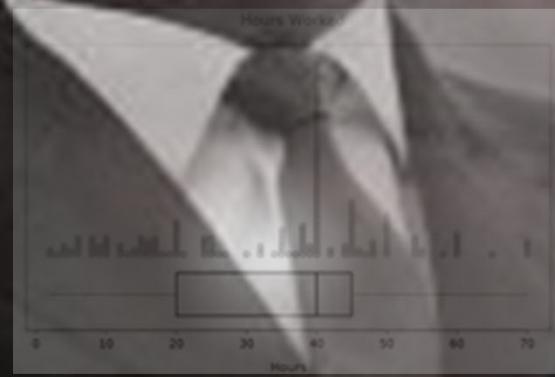
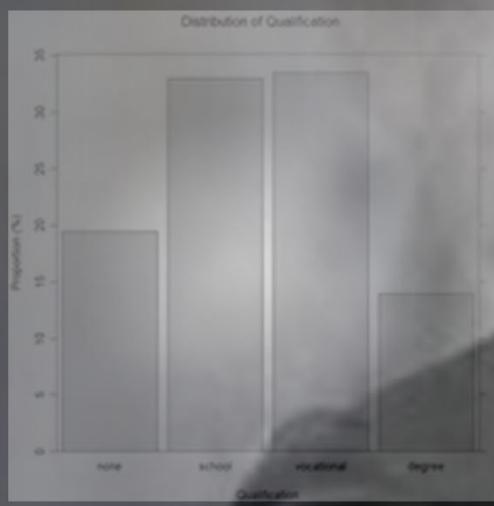
Populate

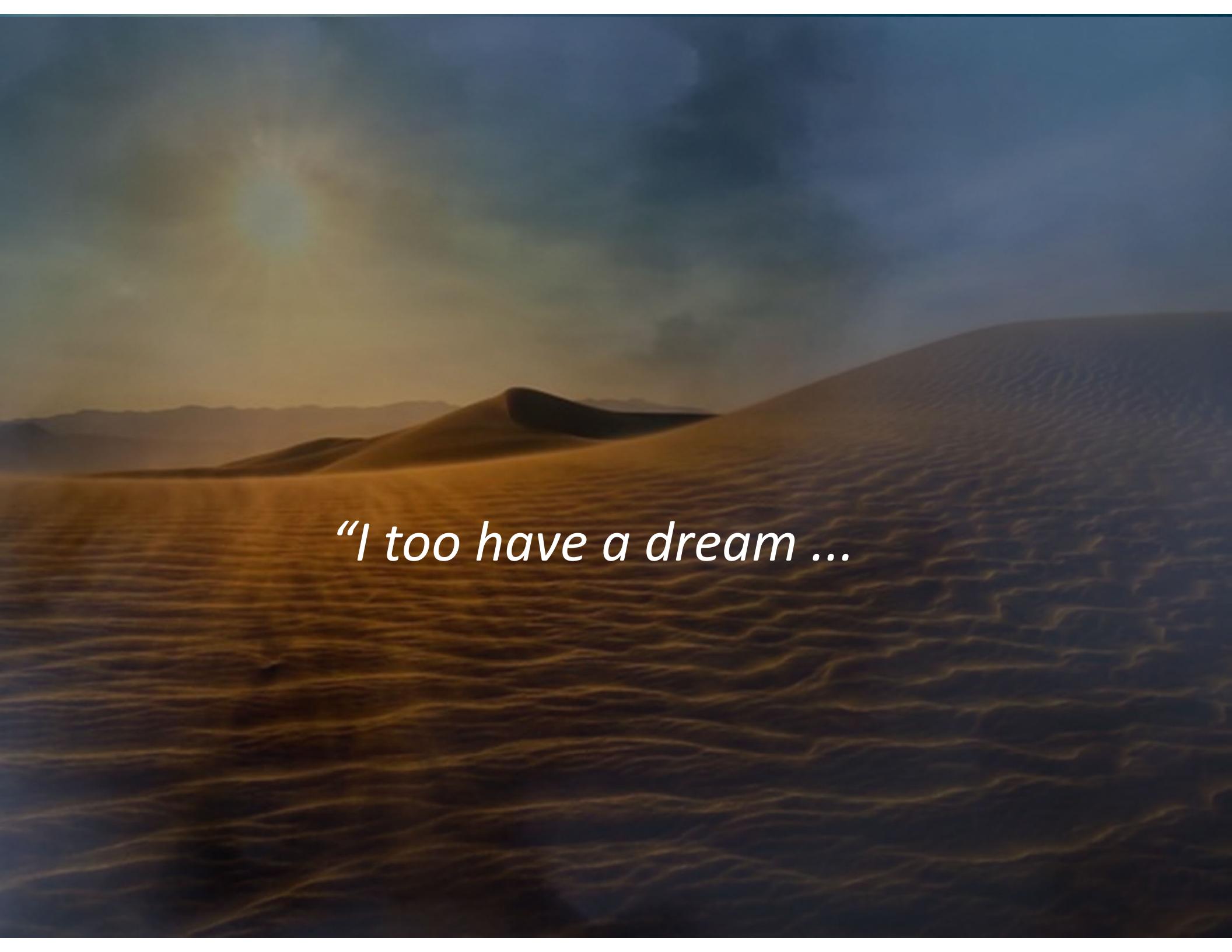
the imagination

with possibilities

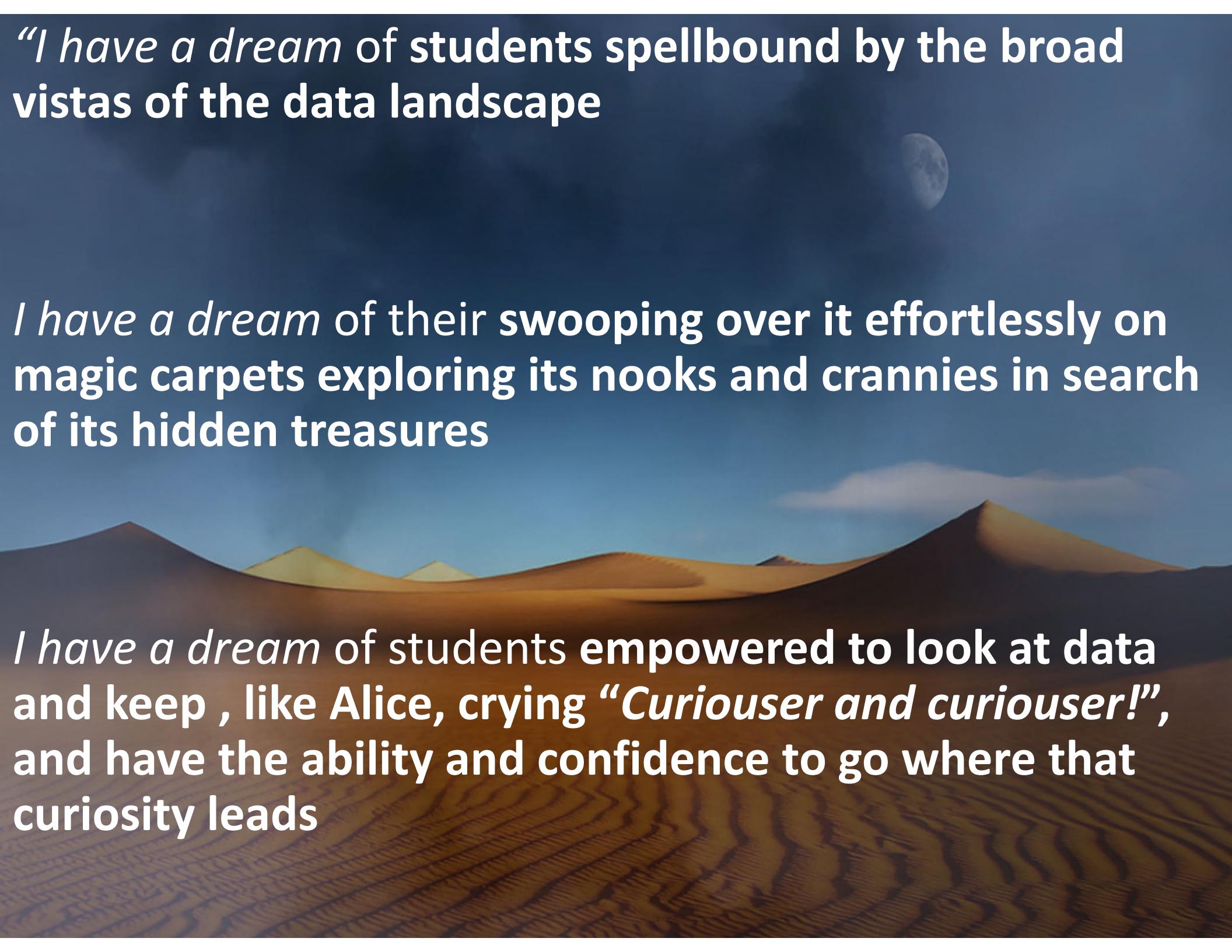


So what have we been
trying to do here??



A wide-angle photograph of a desert landscape. In the foreground, large sand dunes are visible, their surfaces covered in intricate, wavy patterns of light and shadow. The lighting suggests either early morning or late afternoon, with a warm, golden glow on the left side of the frame transitioning into cooler blues and purples on the right. In the distance, a range of mountains is visible against a hazy sky.

“I too have a dream ...

A photograph of a desert landscape at night. In the foreground, there are several large sand dunes with distinct ridges and shadows. The sky above is a deep blue, with a bright crescent moon visible in the upper right quadrant and a single, very bright star or planet in the lower left quadrant.

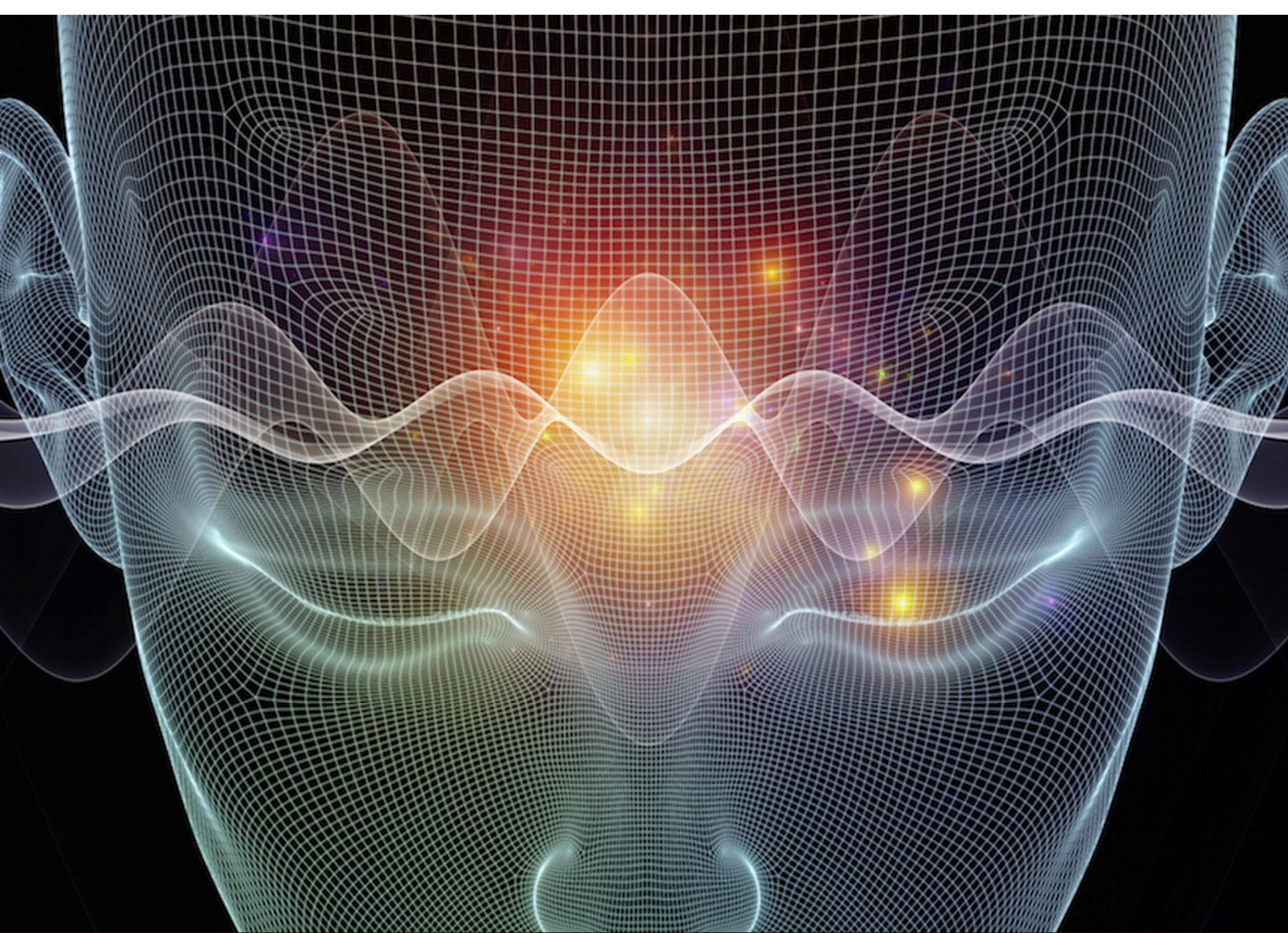
"I have a dream of students spellbound by the broad vistas of the data landscape

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 curioser!*”, and have the ability and confidence to go where that curiosity leads*









Please Rise

for the official Anthem
of Statistics Teachers Day

We will Slap, Slap, Clap, We will Plot You ...



We Will Rock You!