

DESIGNING PLOTS

(& THE GRAMMAR OF GRAPHICS)

OUTLINE

- ① TIDY DATA
- ① DIMENSIONS OF A PLOT
- ② STRATEGIES FOR DESIGN
- ③ MISCELLANEOUS TIPS

TIDY DATA

WIDE FORMAT

NAME	Q1	Q2	T1
ALICE	/	D	C
BOB	F	/	/
CHARLIE	B	C	B
EVE	A	A	B

ROW = OBSERVATION

LONG FORMAT

NAME	TEST	GRADE
ALICE	Q2	D
ALICE	Q3	C
BOB	Q1	F
CHARLIE	Q1	B
CHARLIE	Q2	C
CHARLIE	T1	B
	:	

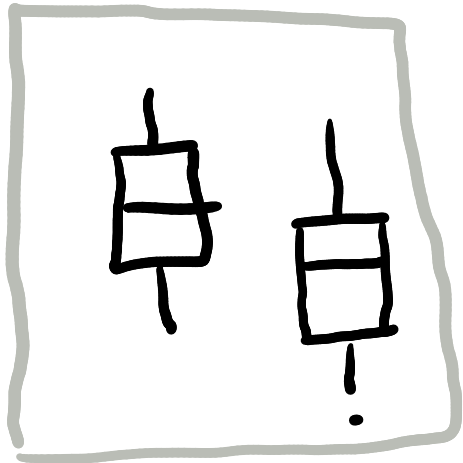
COLUMN = VARIABLE

①

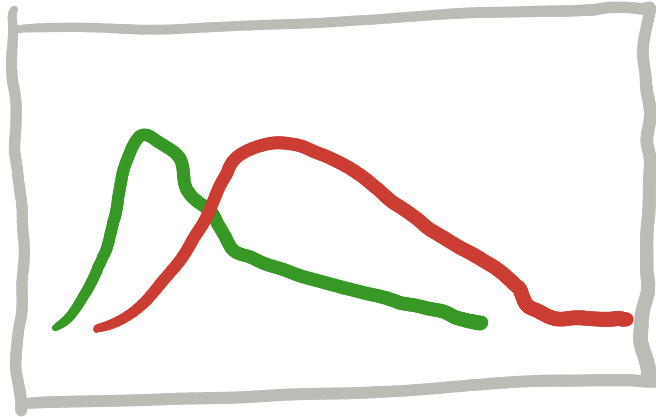
DESIGNING A PLOT

START WITH A STORY

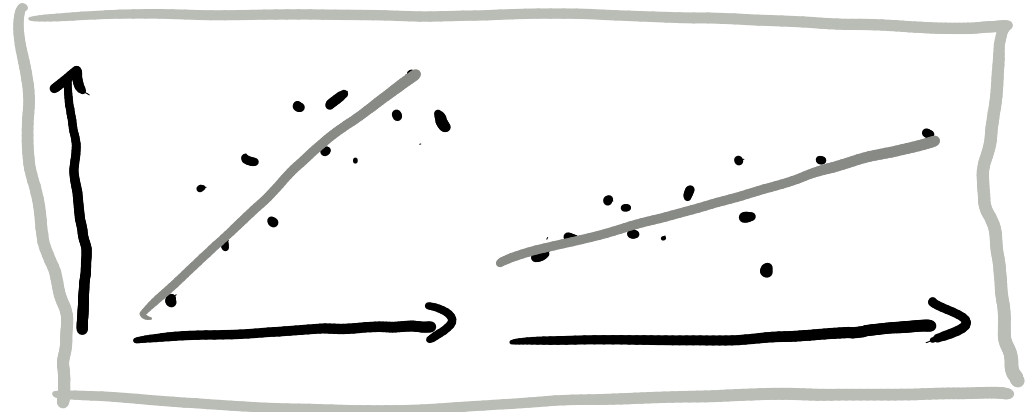
WHAT DO YOU WANT TO SHOW?



EFFECT



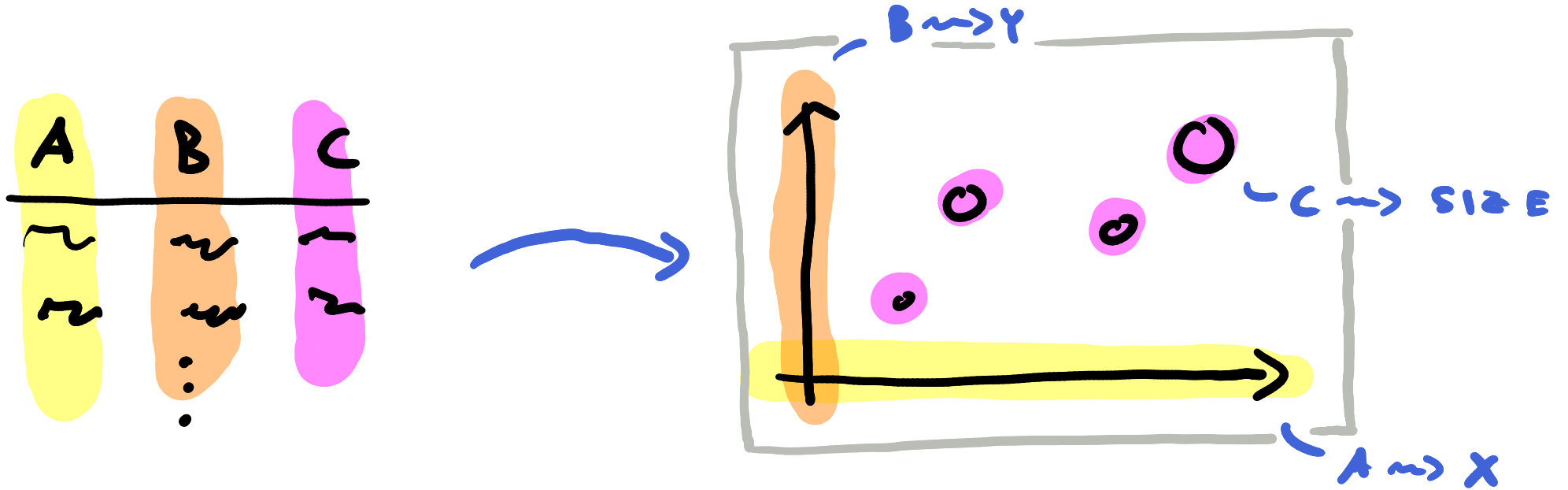
SHAPE



TREND

CLUSTERS, TRAJECTORIES, DIAGNOSTICS, MODEL
FITS, IMPROVEMENTS, RELATIONS, ...

DIMENSIONS OF A PLOT



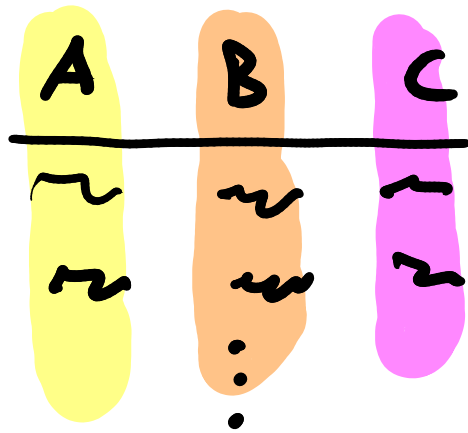
FEATURES



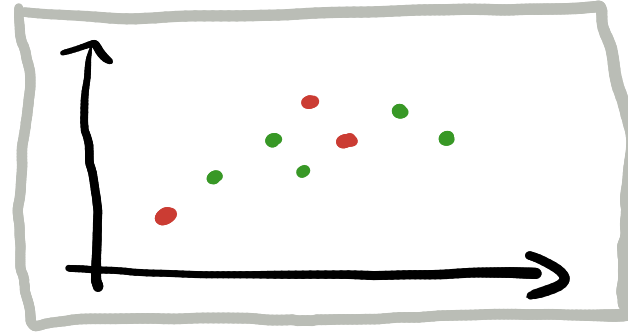
AESTHETICS

DIMENSIONS OF A PLOT

GEOMETRIES

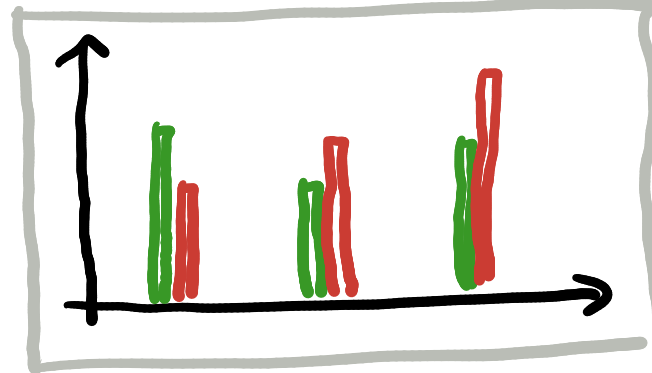


POINT



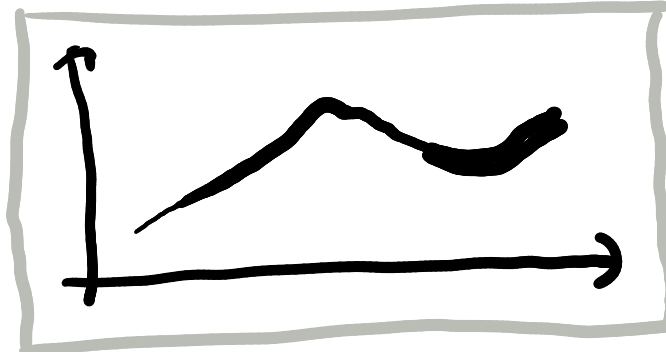
$C \leadsto \text{COLOR}$

BAR



$C \leadsto \text{COLOR GROUP}$

LINE



$C \leadsto \text{WIDTH}$

DIMENSIONS OF A PLOT

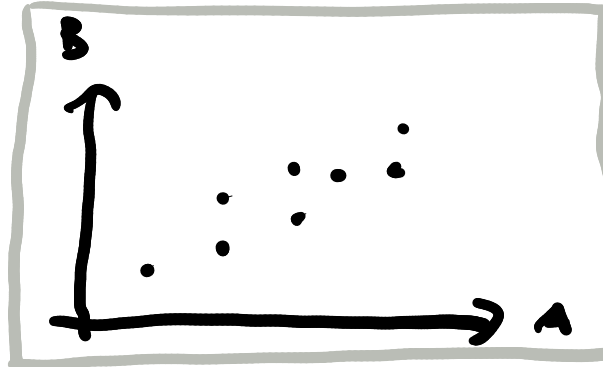
STATISTICS

A	B
~	~
~	~
~	~
⋮	

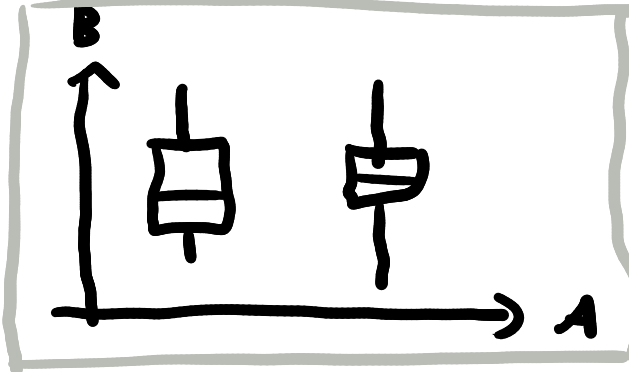
ID

BOXPLOT

BIN



POINT



BOXPLOT

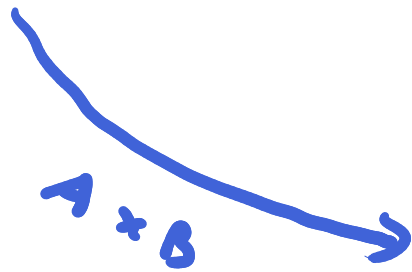
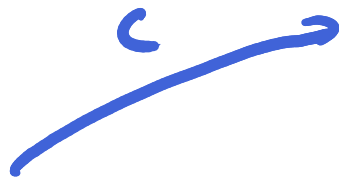


HISTOGRAM

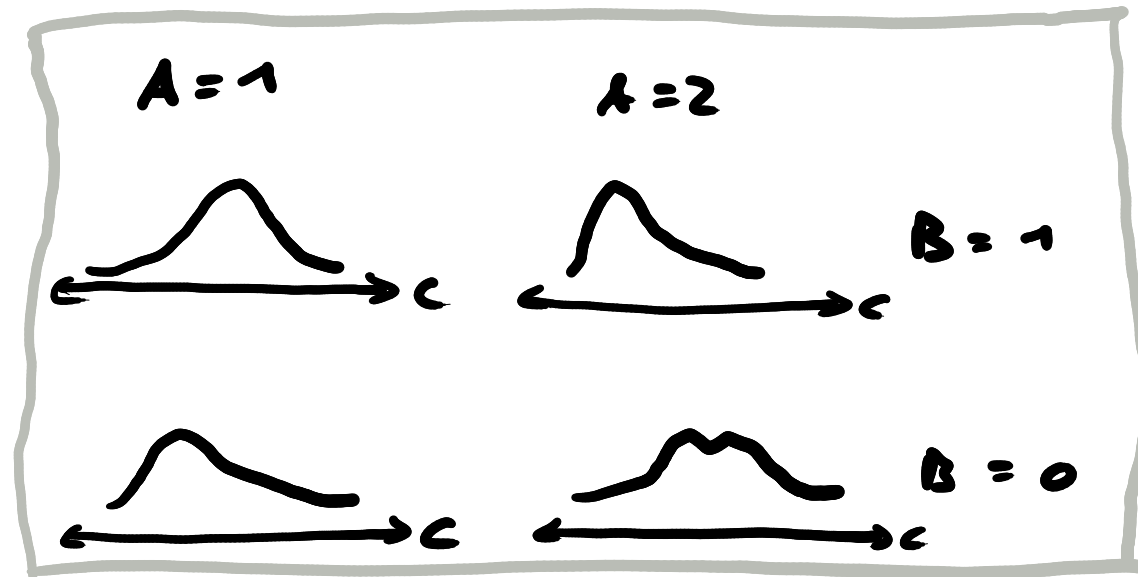
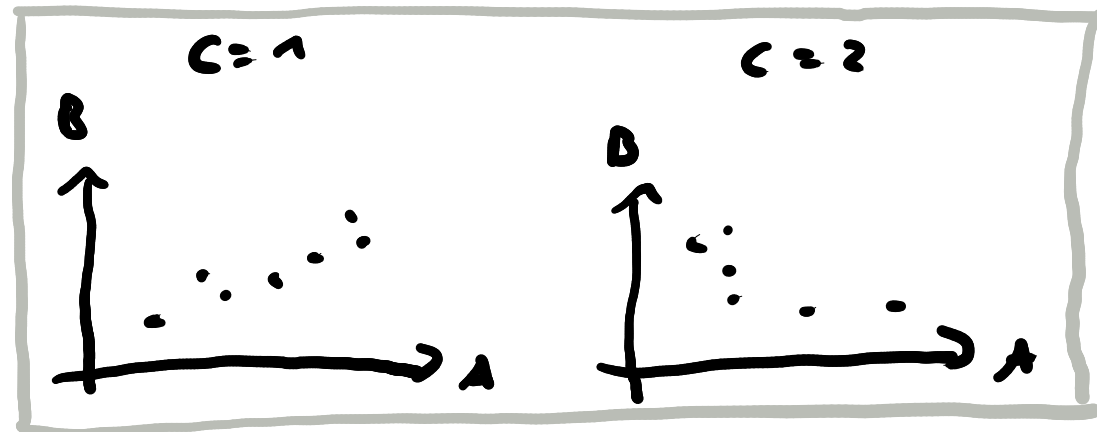
DIMENSIONS OF A PLOT

FACETS

A	B	C
~	~	~
~	~	~
	⋮	

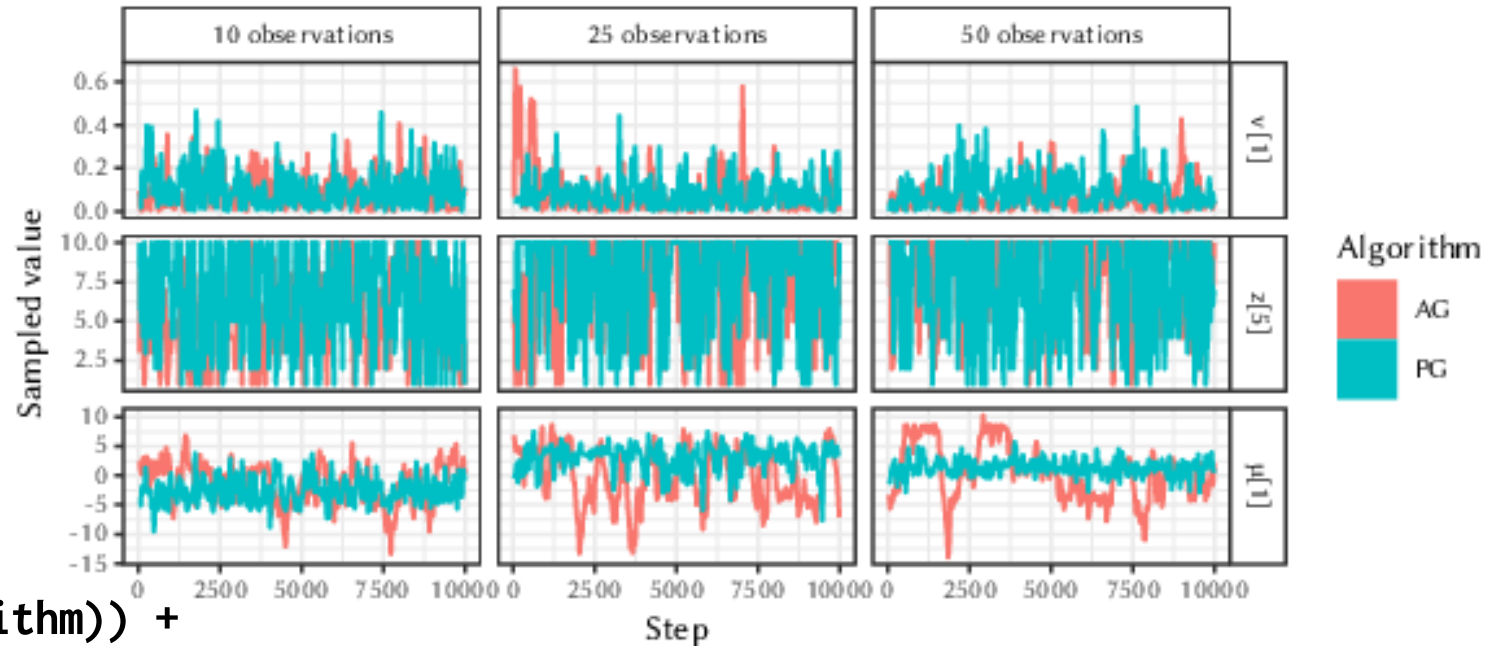


(="SMALL MULTIPLES")



GGPLOT 2

Chain comparisons for IMM

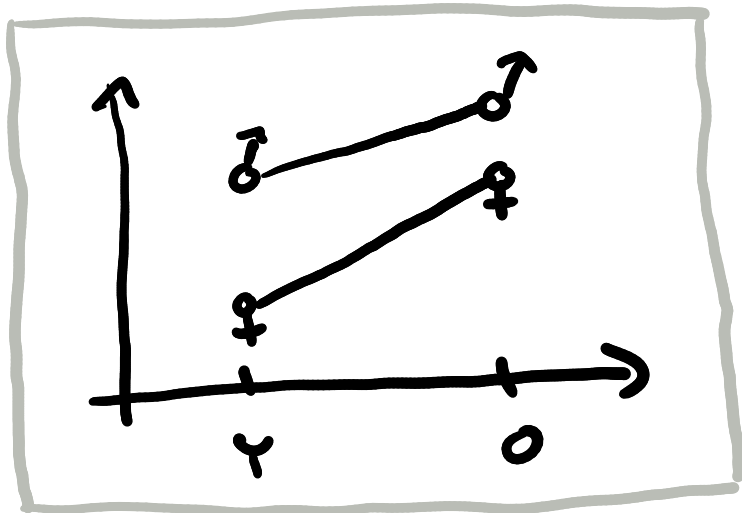
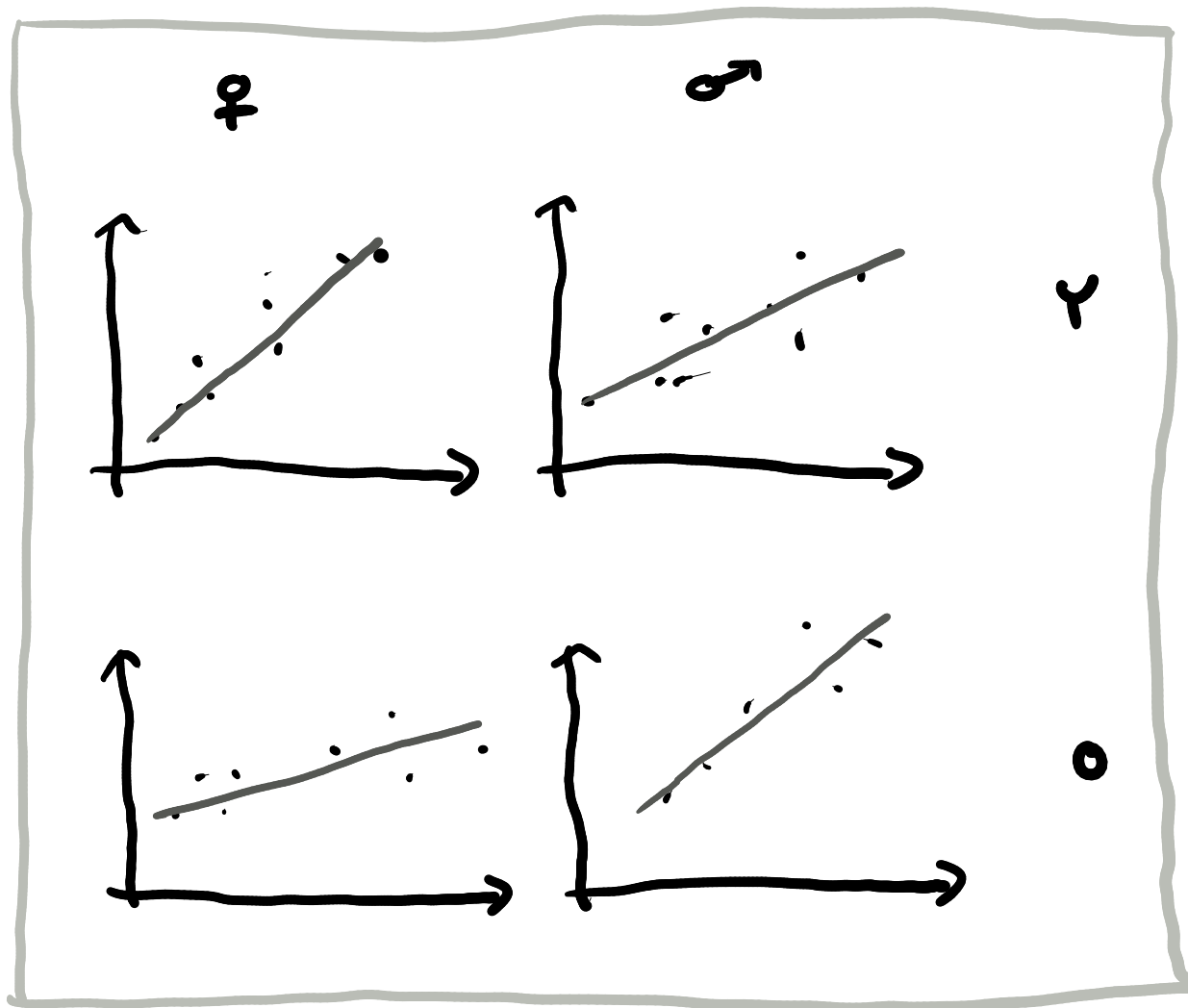
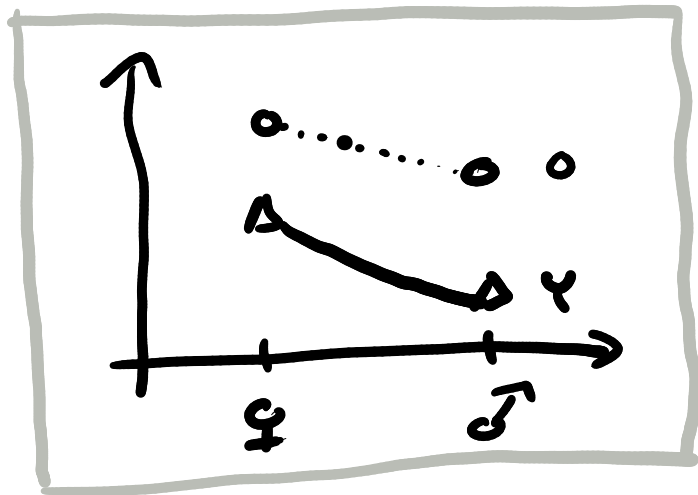


```
ggplot(aes(x = step,  
           y = value,  
           color = discrete_algorithm)) +  
  geom_line(size = 0.6, key_glyph = draw_key_rect) +  
  facet_grid(parameter ~ data_size,  
             labeller = labeller(data_size = obs_labeller),  
             scales = "free_y") +  
  labs(x = "Step", y = "Sampled value",  
       color = "Algorithm",  
       title = paste("Chain comparisons for", model))
```

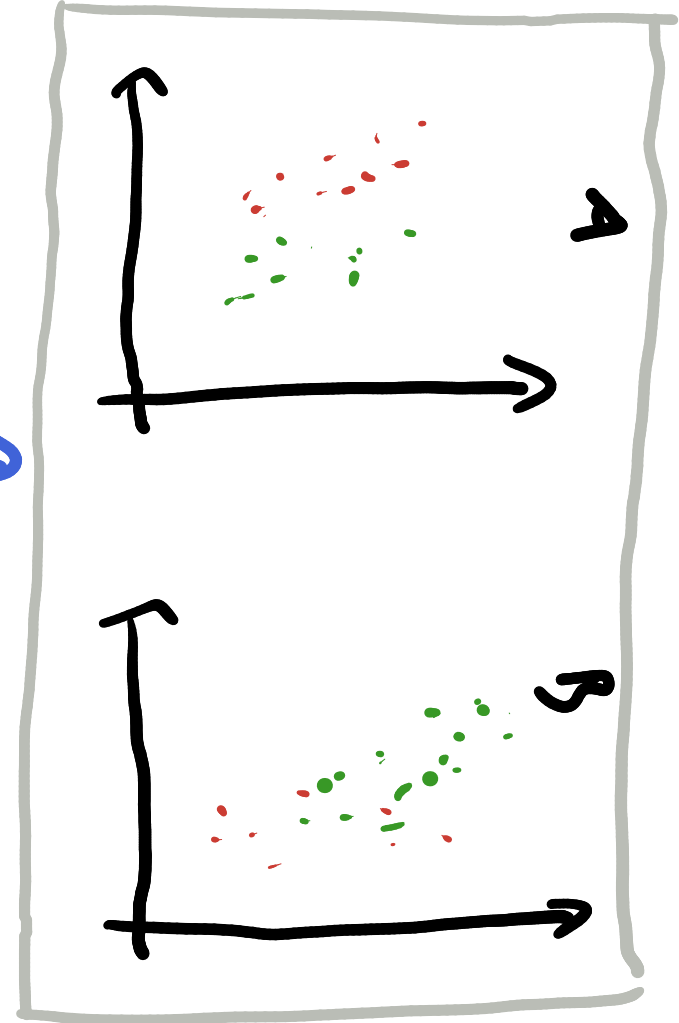
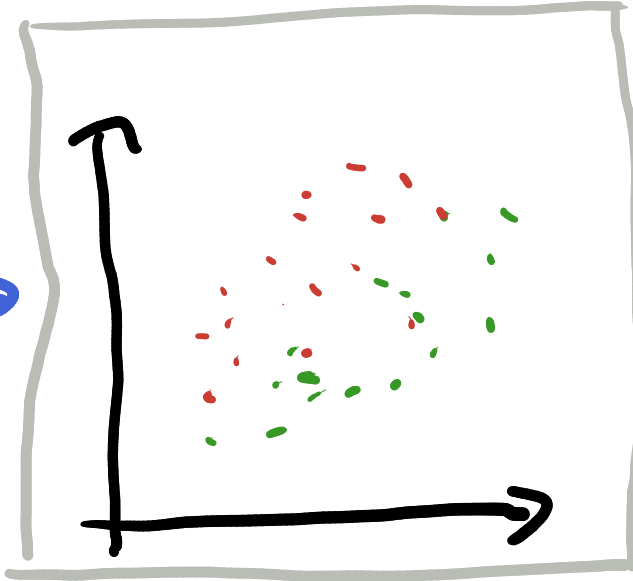
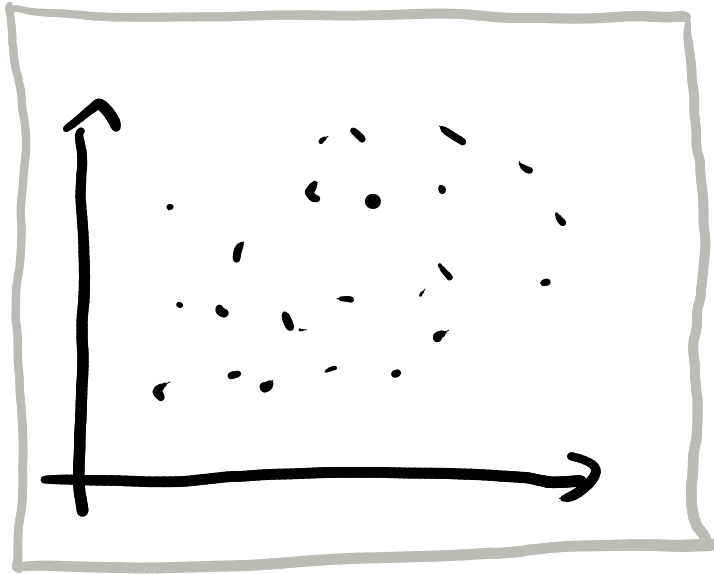
②

STRATEGIES

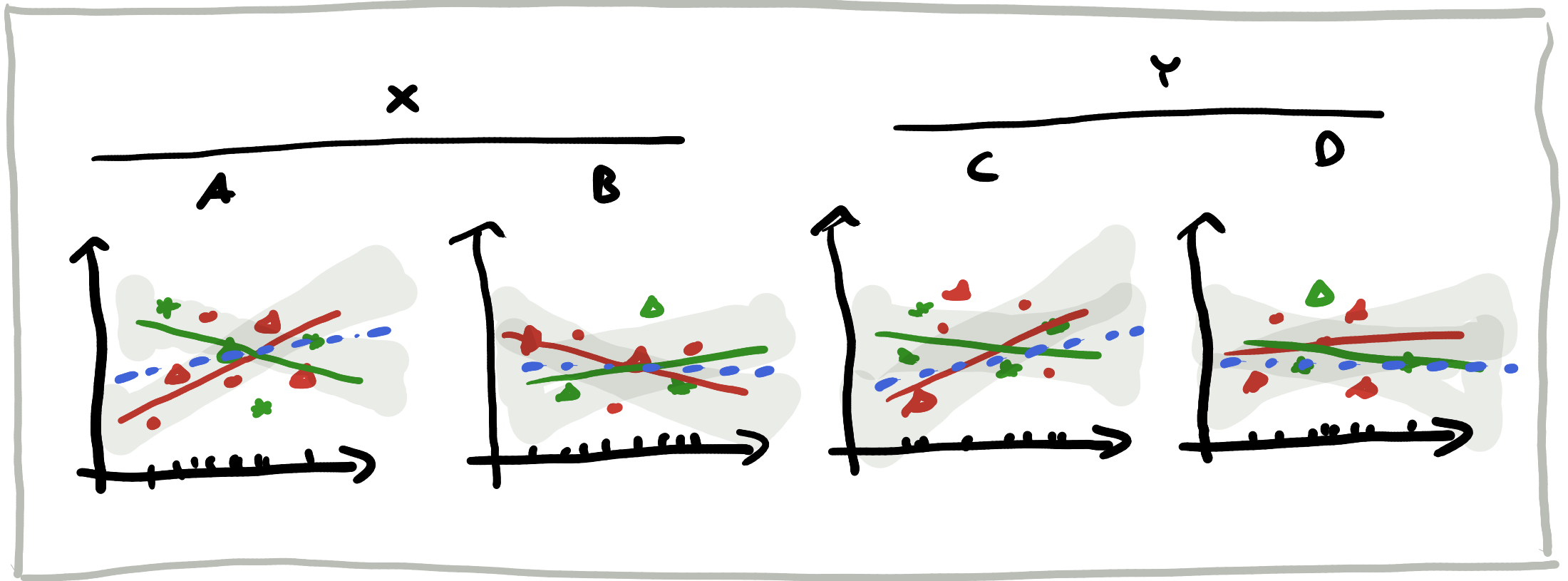
THINK ON PAPER FIRST



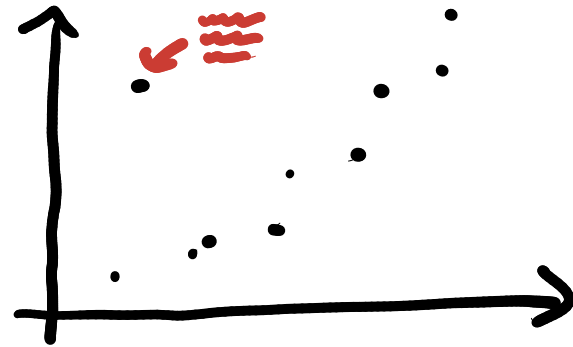
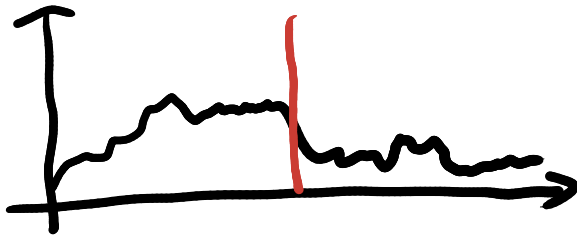
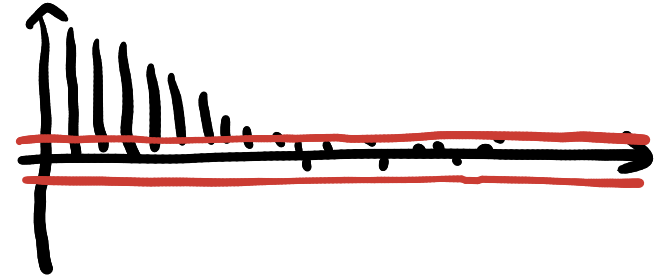
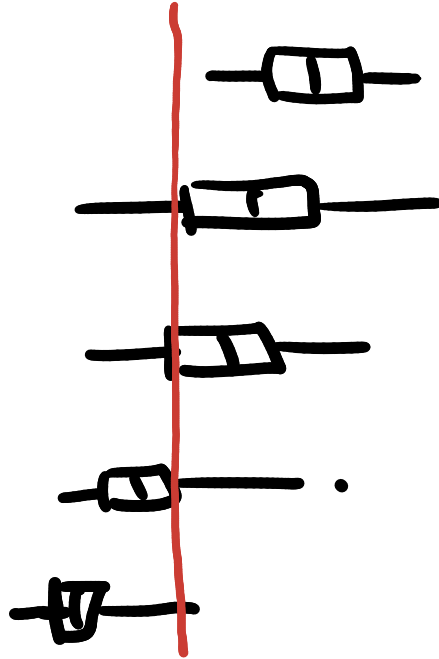
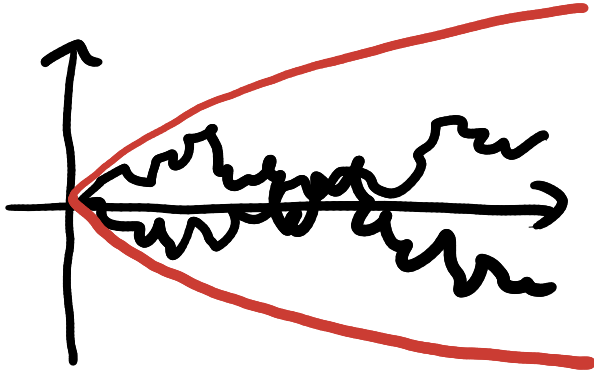
START WITH MARGINALS



DON'T OVERDO DIMENSIONS



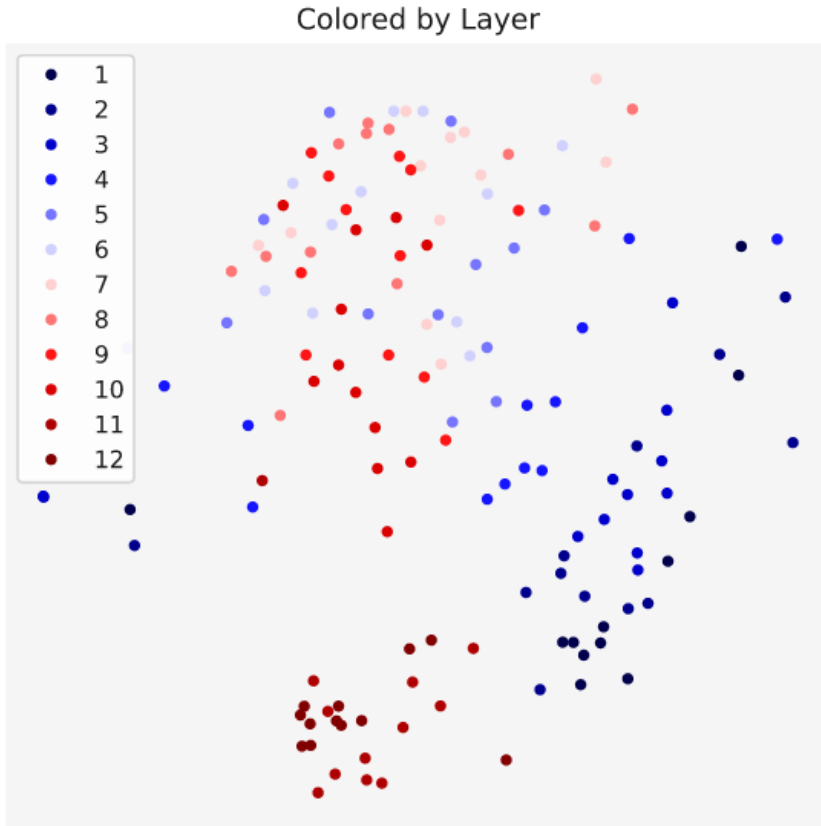
"HELP LINES"



③

MISCELLANEOUS TIPS

WATCH YOUR COLOR SCALES!

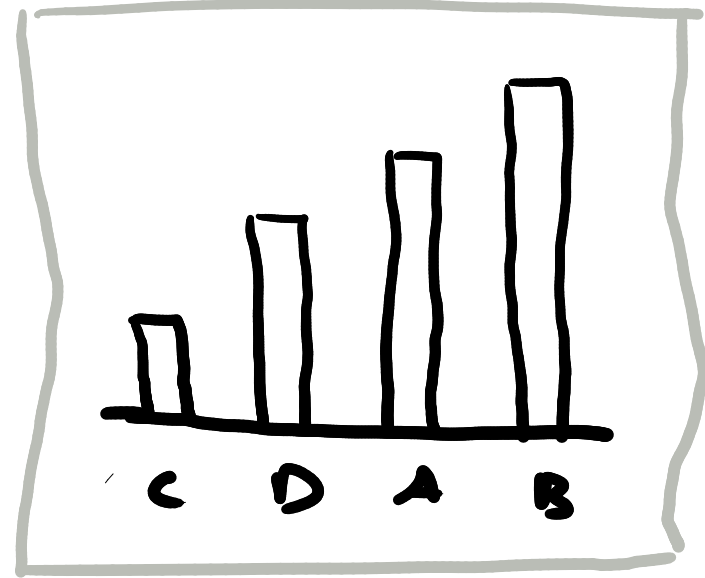
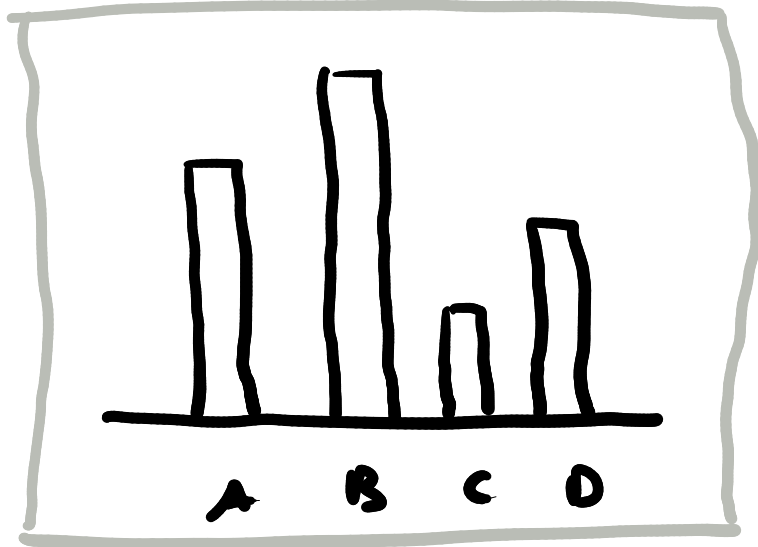


- DISCRETE
 - > CATEGORICAL
 - > ORDERED
- CONTINUOUS
 - > BOUNDED
 - > ABSOLUTE
 - ⋮

WATCH OUT FOR:

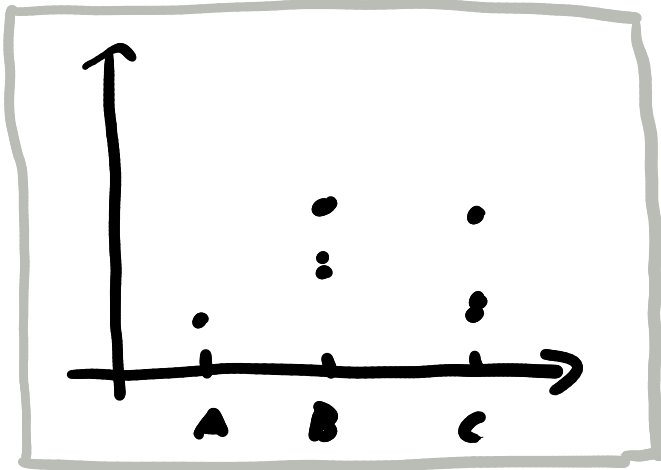
- > COLOR-BLINDNESS
- > NATURAL MAPPINGS

CARE ABOUT FACTORS!

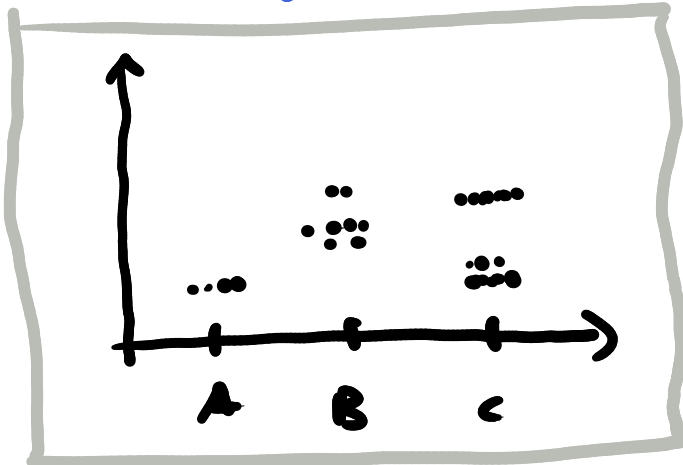


"ALABAMA FIRST" EFFECT

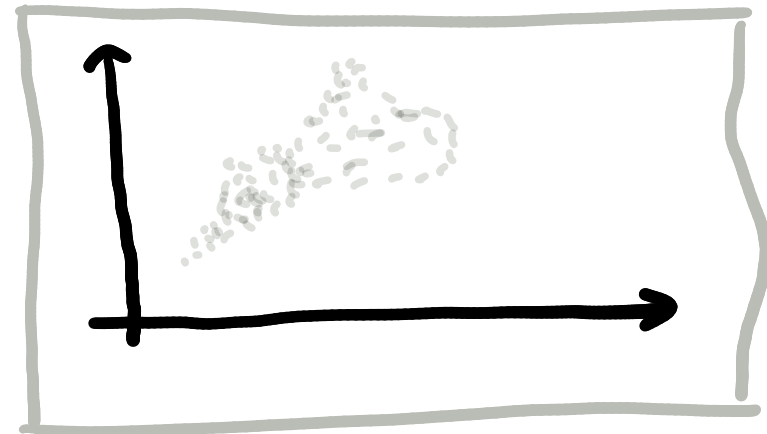
DE-CLUTTER DENSE DATA



↓ JITTER



↓ $\alpha < 1$



MORE

- ALIGN AXES IN FACETS / OVERLAYS
- FREE OR FIX AXES IN FACETS
- USE REGRESSION OPTIONS
- TUNE SCALE & LEGEND LABELS
- CHOOSE PROPORTIONS RIGHT
 - > CONT. / DISCRETE
 - > LOG / EXP / SQR
 - > RADIUS / AREA

REMEMBER STANDARDS

BOXPLOT

QQ-PLOT

AUTO CORRELATION

INTERACTION
PLOT

RESIDUAL
DIAGNOSTICS

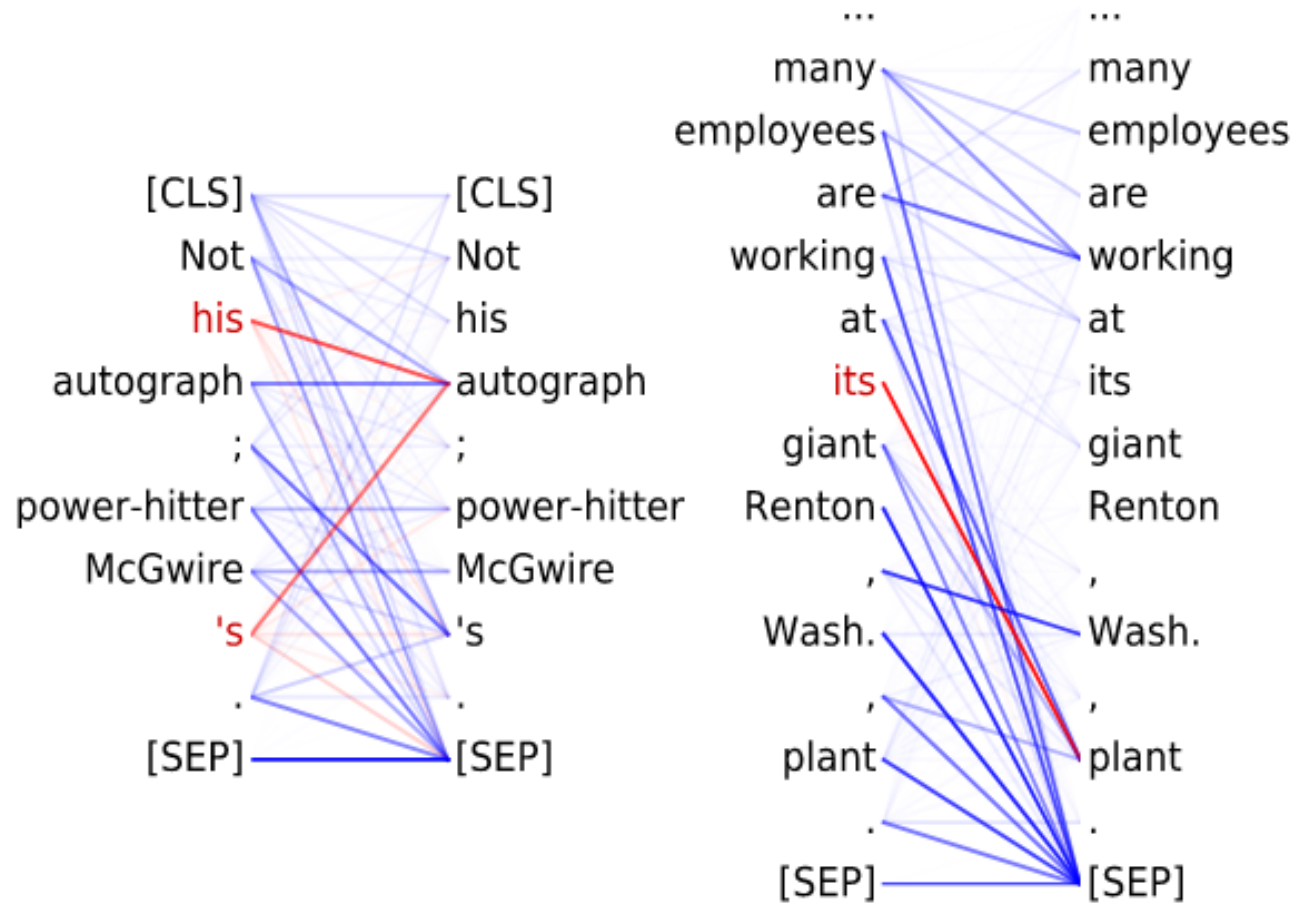
STATISTICS!

⋮

PUBLICATION QUALITY

- DESIGN TO ABSOLUTE SCALE
- MATCH & EMBED FONTS
- FINE-TUNE AFTER DESIGN
- BE CONSISTENT
 - > USE THEMES
 - > FIX BASE COLORS

EXAMPLE I



EXAMPLE II

