

experiment sandbox



resource: experimental design 4 the life sciences 4e

@cjlortie

statistics do not fix (any/all) problems

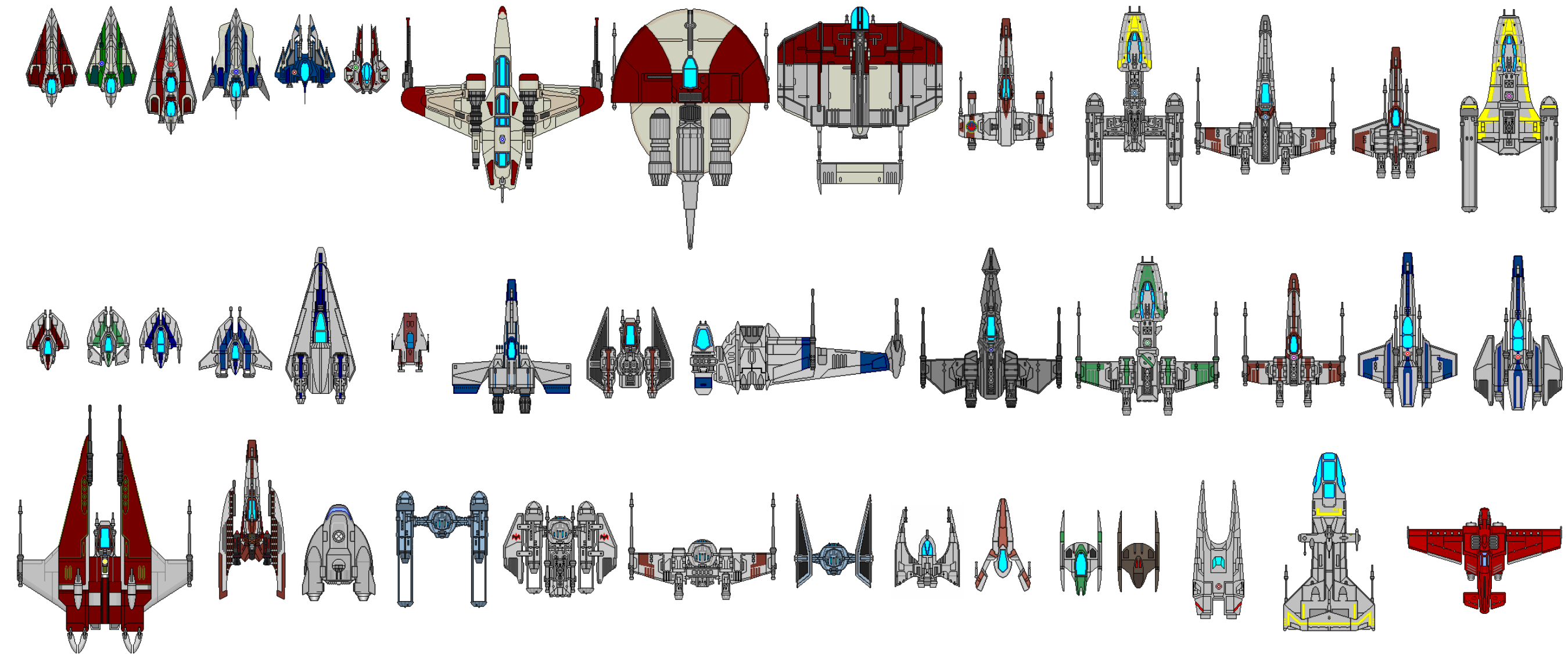


good thinking & good design precedes good data



avoid the path of the darkside

be mindful of scale: samples to populations



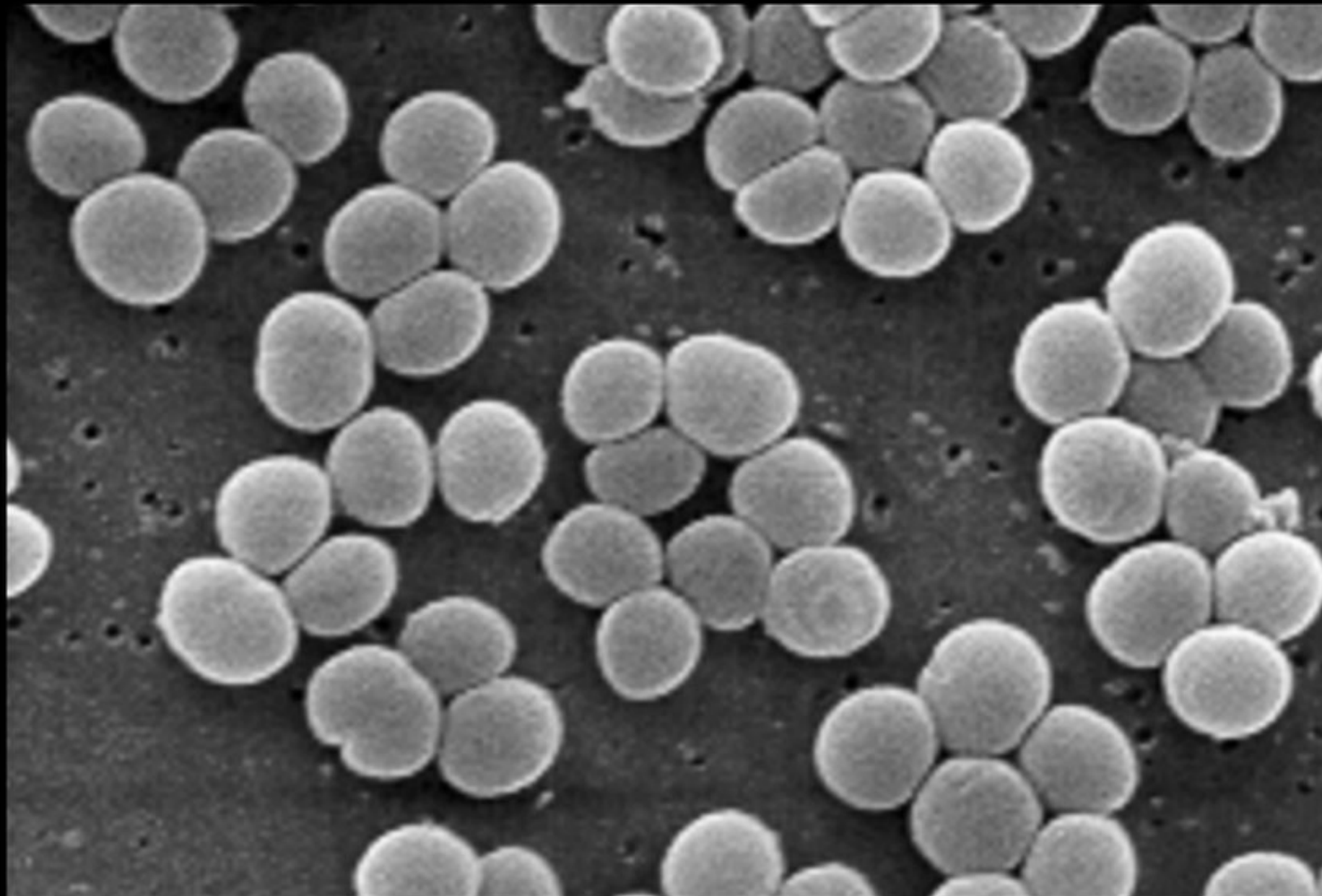
focus on independence

apophenia



data science is the end of science.

Calude & Longo 2016



Midi-Chlorians

The answer you didn't want, to the question you didn't ask

design thinking is more than thinking about
the biology of a system or the maths and statistics

design thinking for experiments
is creative structural
a priori planning and observation.

it also includes adaptive iteration
(ideation & revisions).



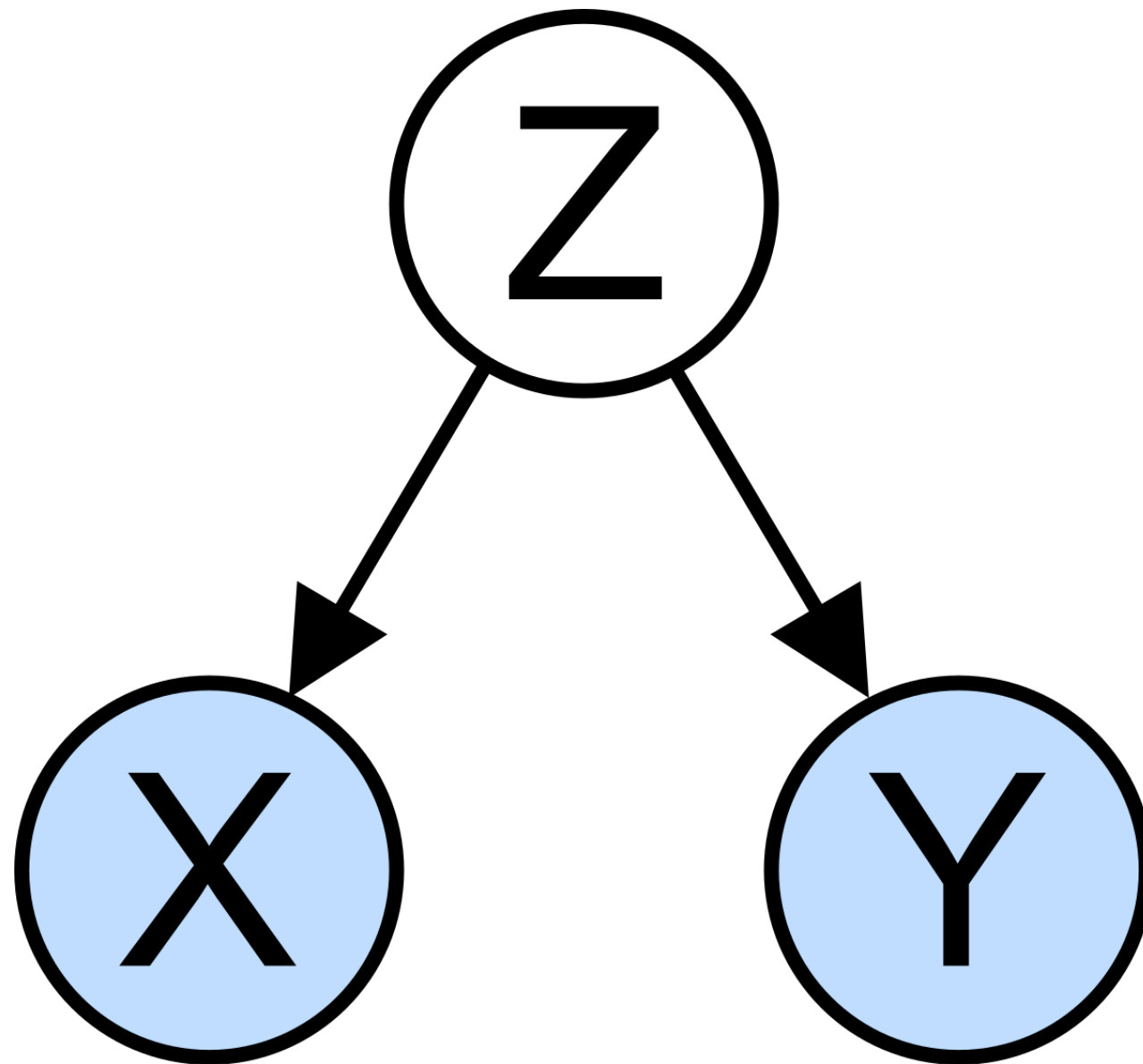
it is both science and art.

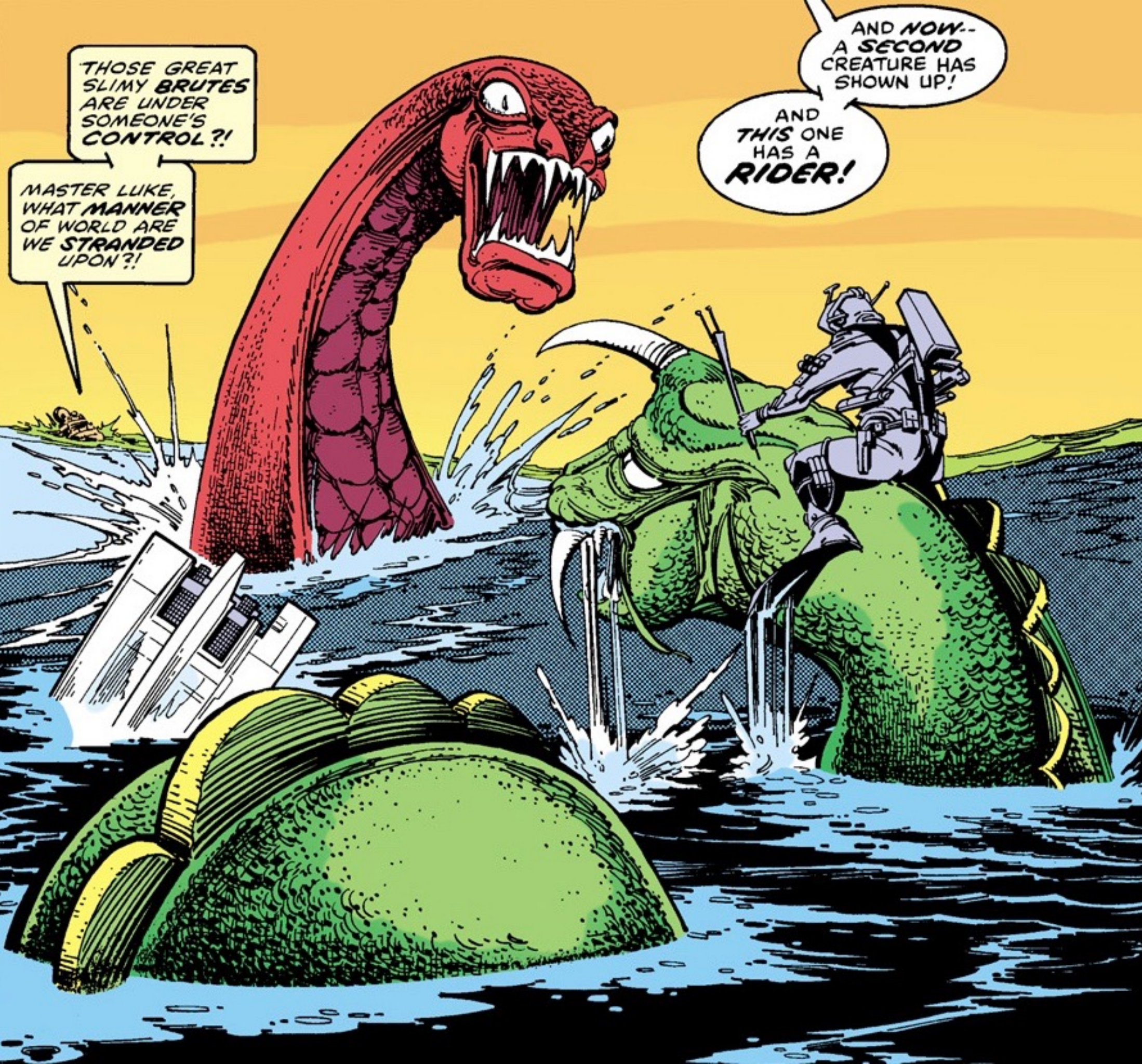
null hypothesis testing versus Bayesian priors



goal is to minimize random variation

confounding variation





THOSE GREAT
SLIMY BRUTES
ARE UNDER
SOMEONE'S
CONTROL?!

MASTER LUKE,
WHAT MANNER
OF WORLD ARE
WE STRANDED
UPON?!

AND NOW--
A SECOND
CREATURE HAS
SHOWN UP!

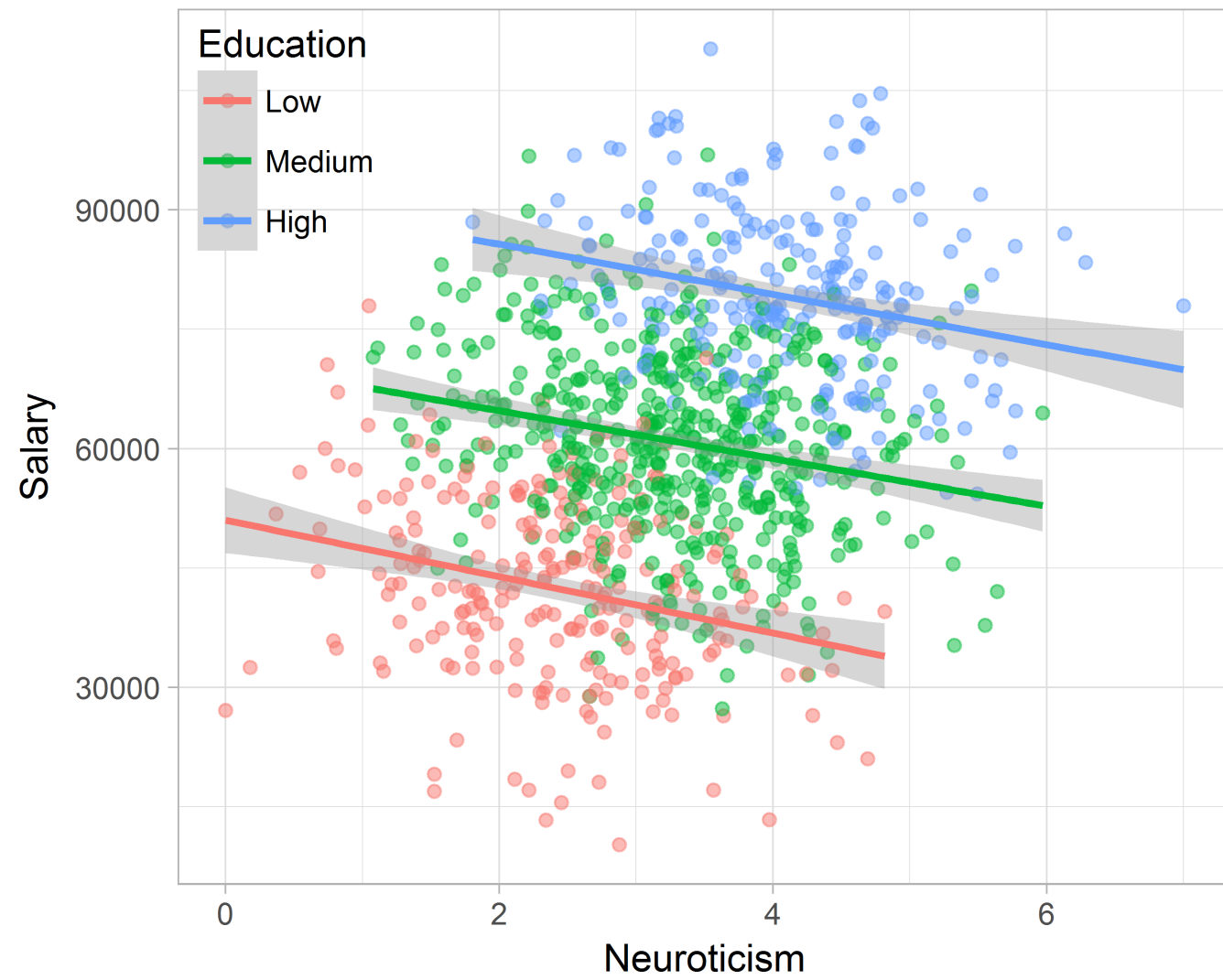
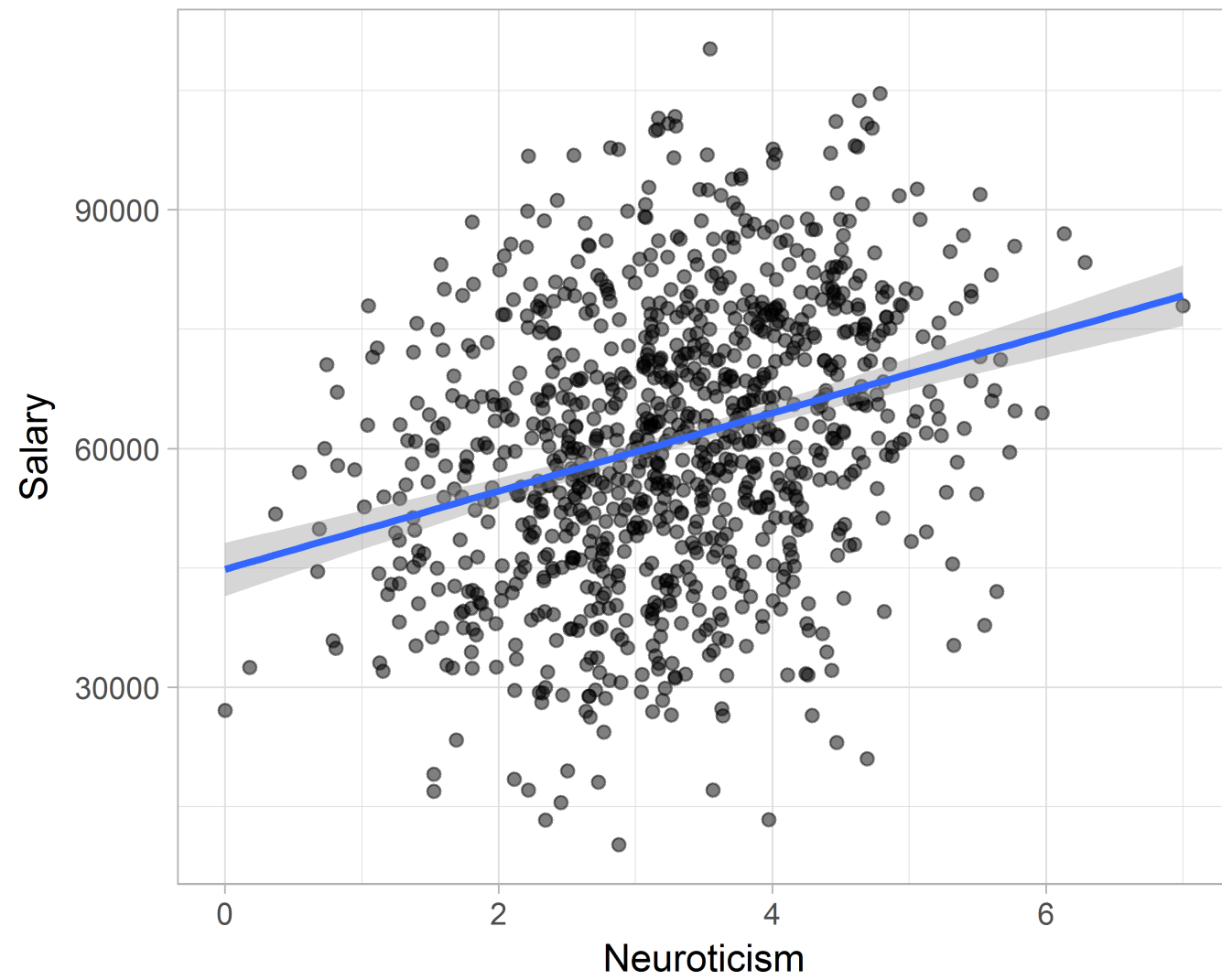
AND
THIS ONE
HAS A
RIDER!

swimming
in a sea
of variation



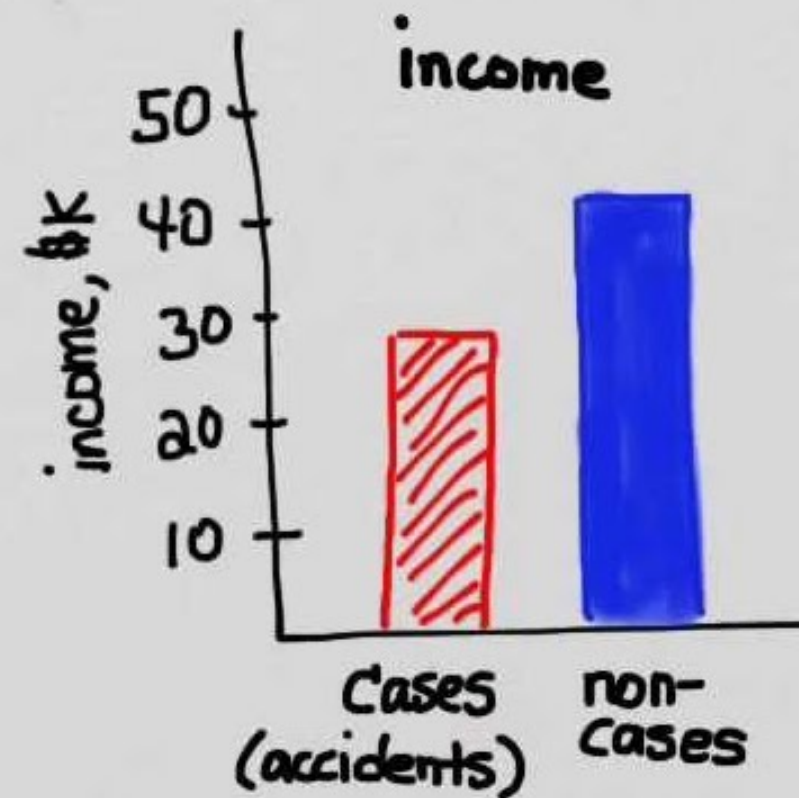
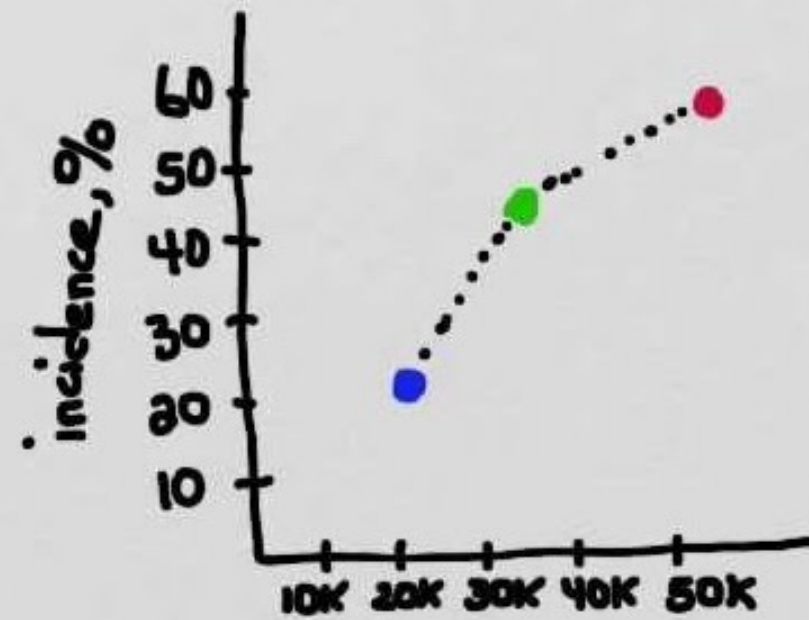
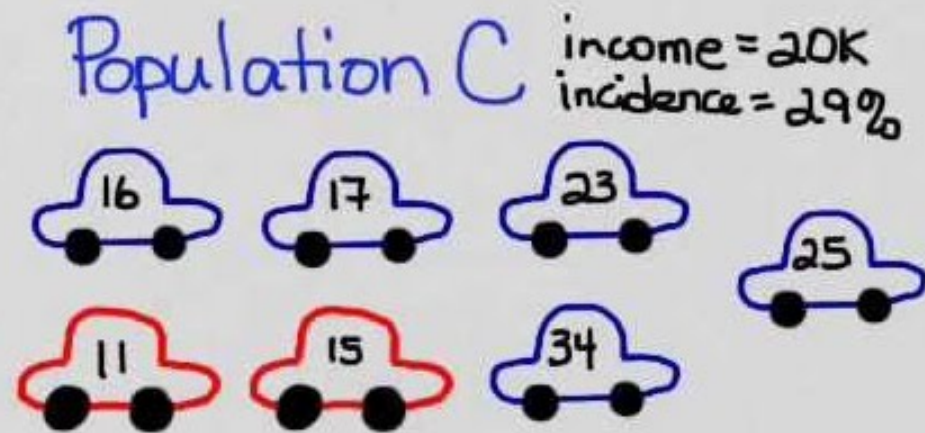
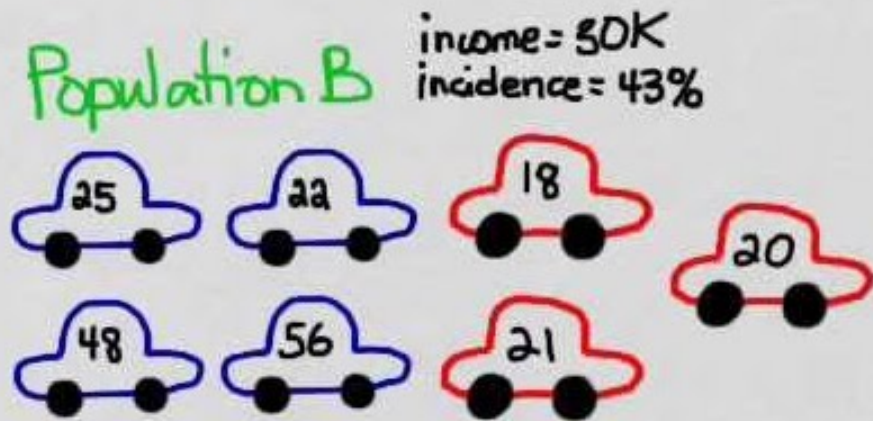
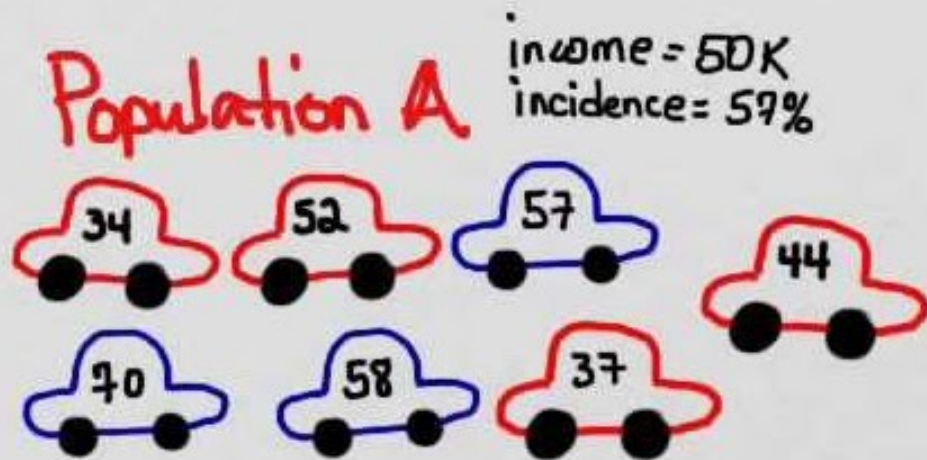
control variation

Simpson's Paradox



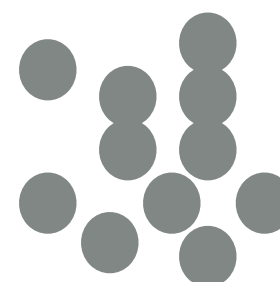
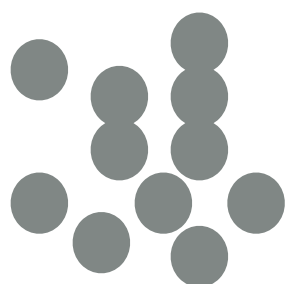
subject is the most fine-grain scale
of sample you can manage and randomize
to ensure independence

ecological fallacy



ef

sp



design thinking = structure to the best subject level

do or do not. there is no try.

HELP ME OBI-WAN KENOBI



YOU'RE MY ONLY HOPE