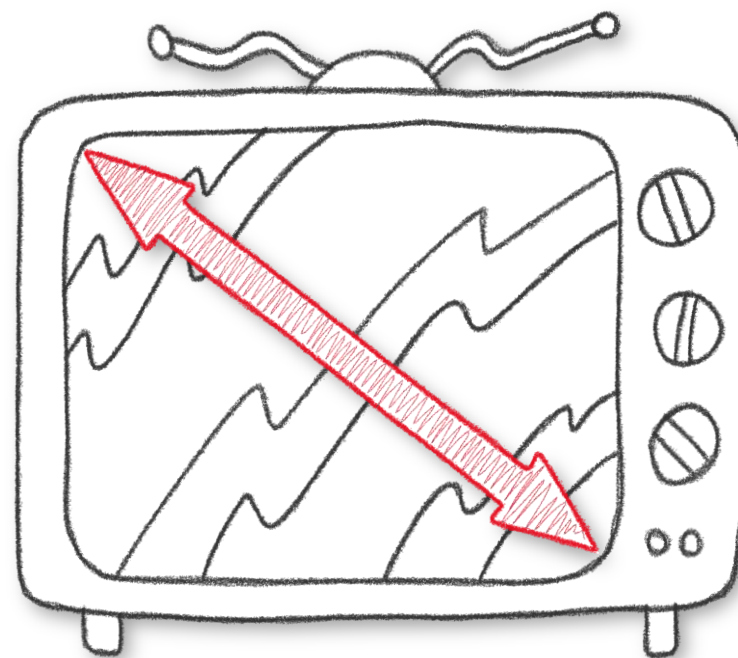
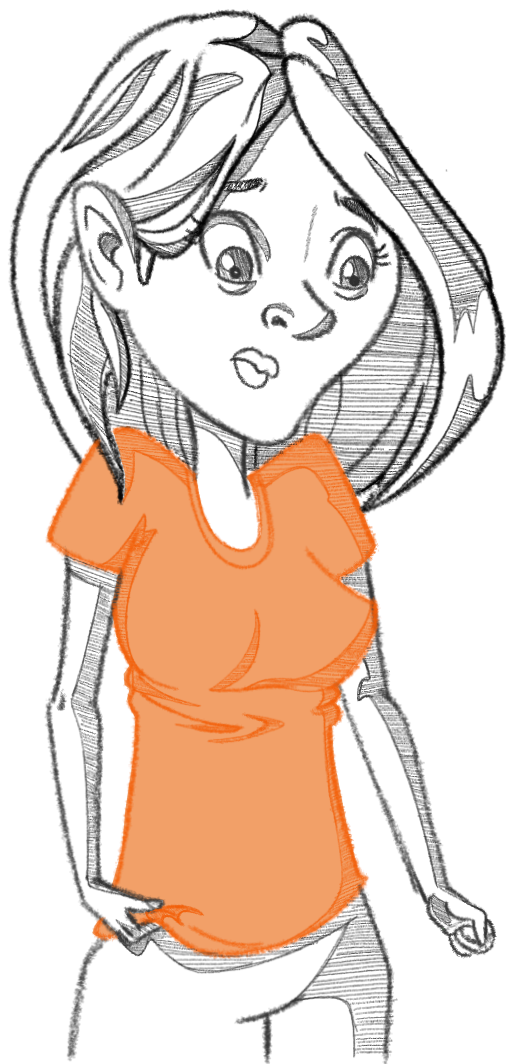




acuitas

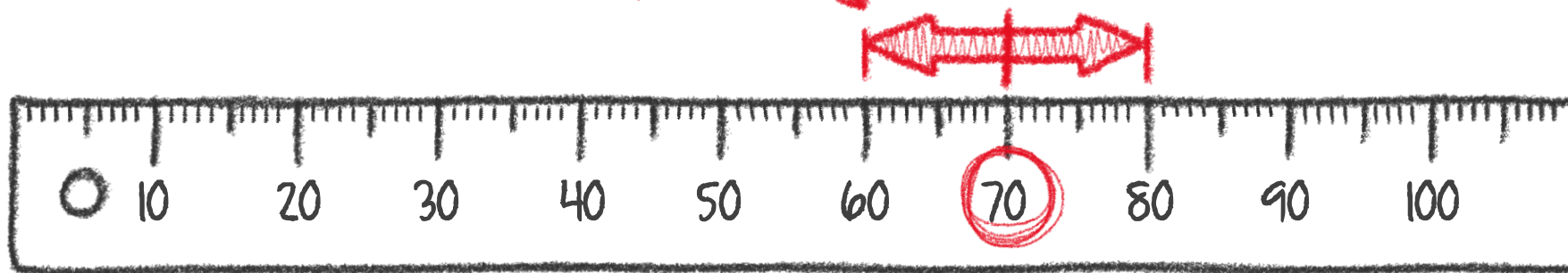
So what is up with this
'Bayesian' analysis stuff?

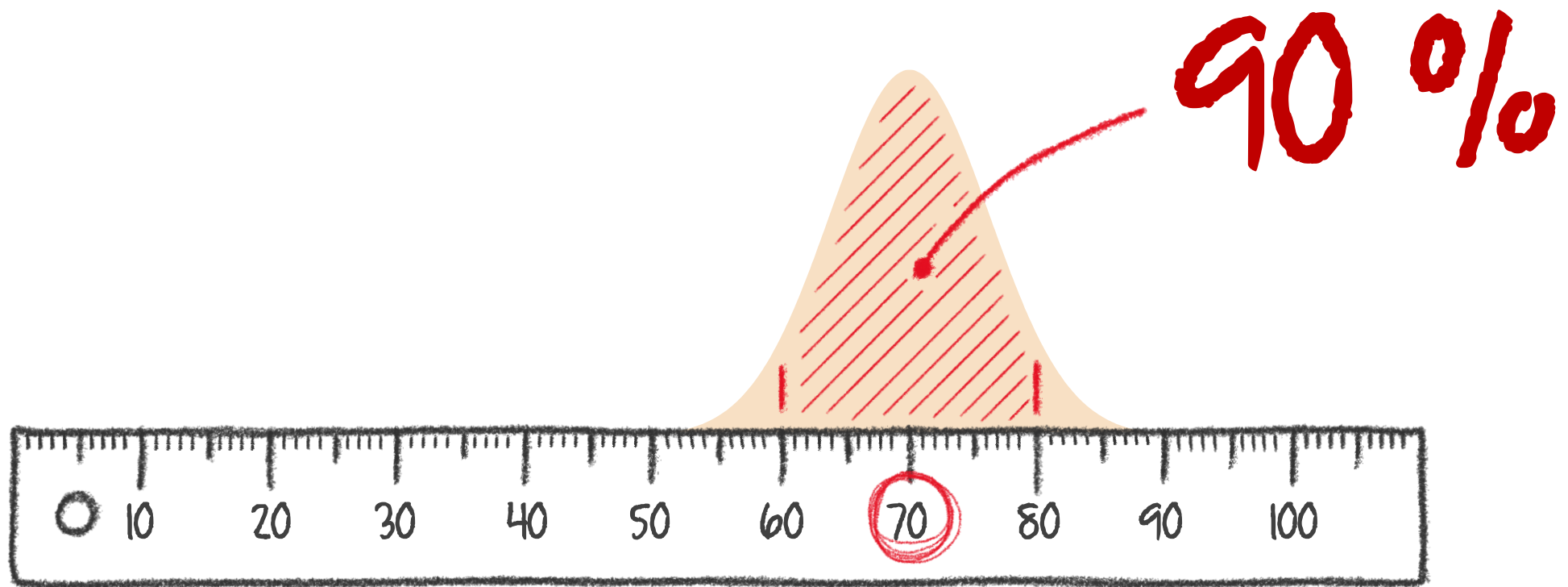


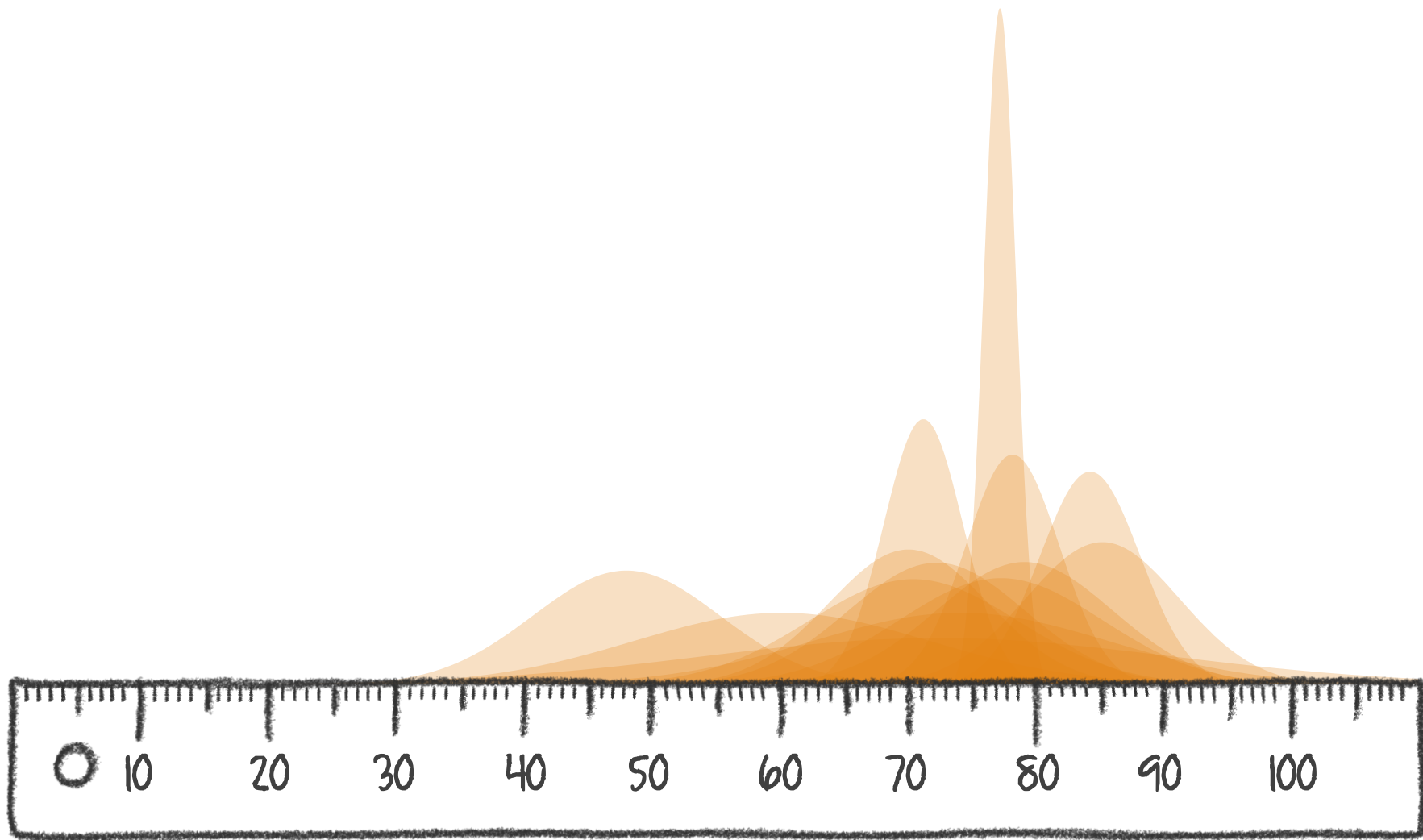
... how long is the
diagonal of the TV
screen?

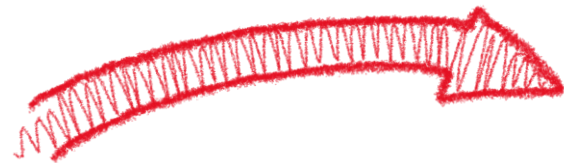
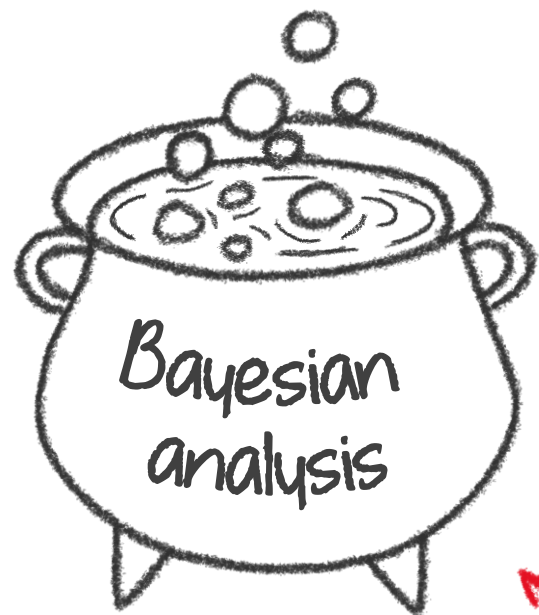
± 10

90 %
confident

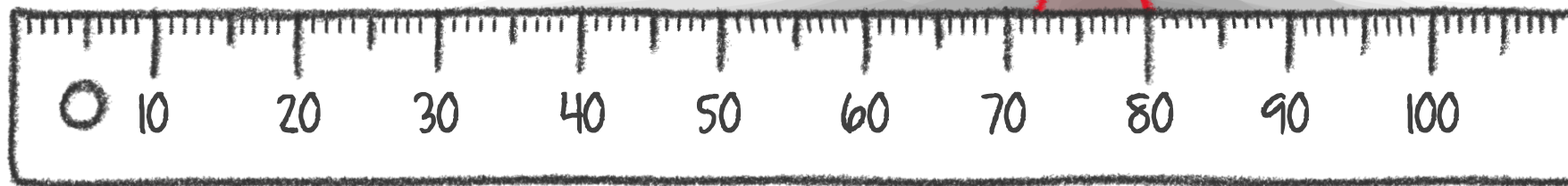
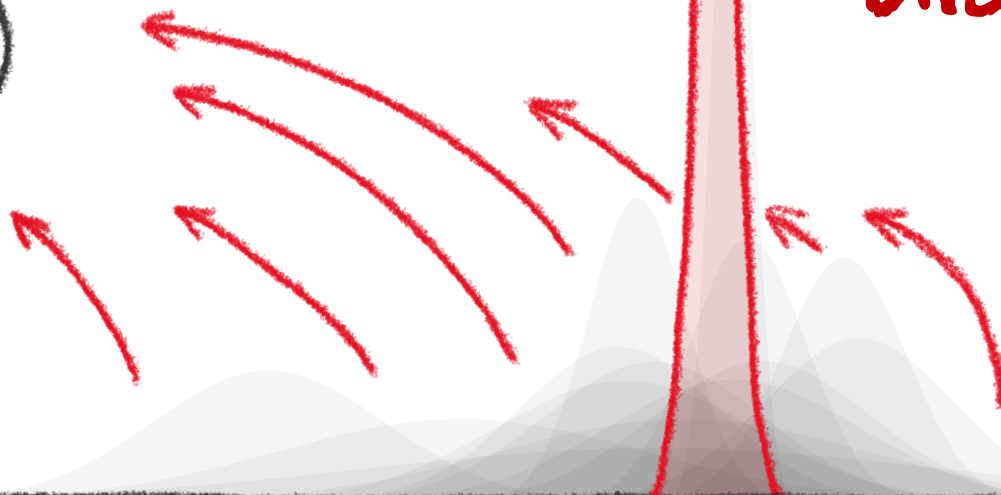






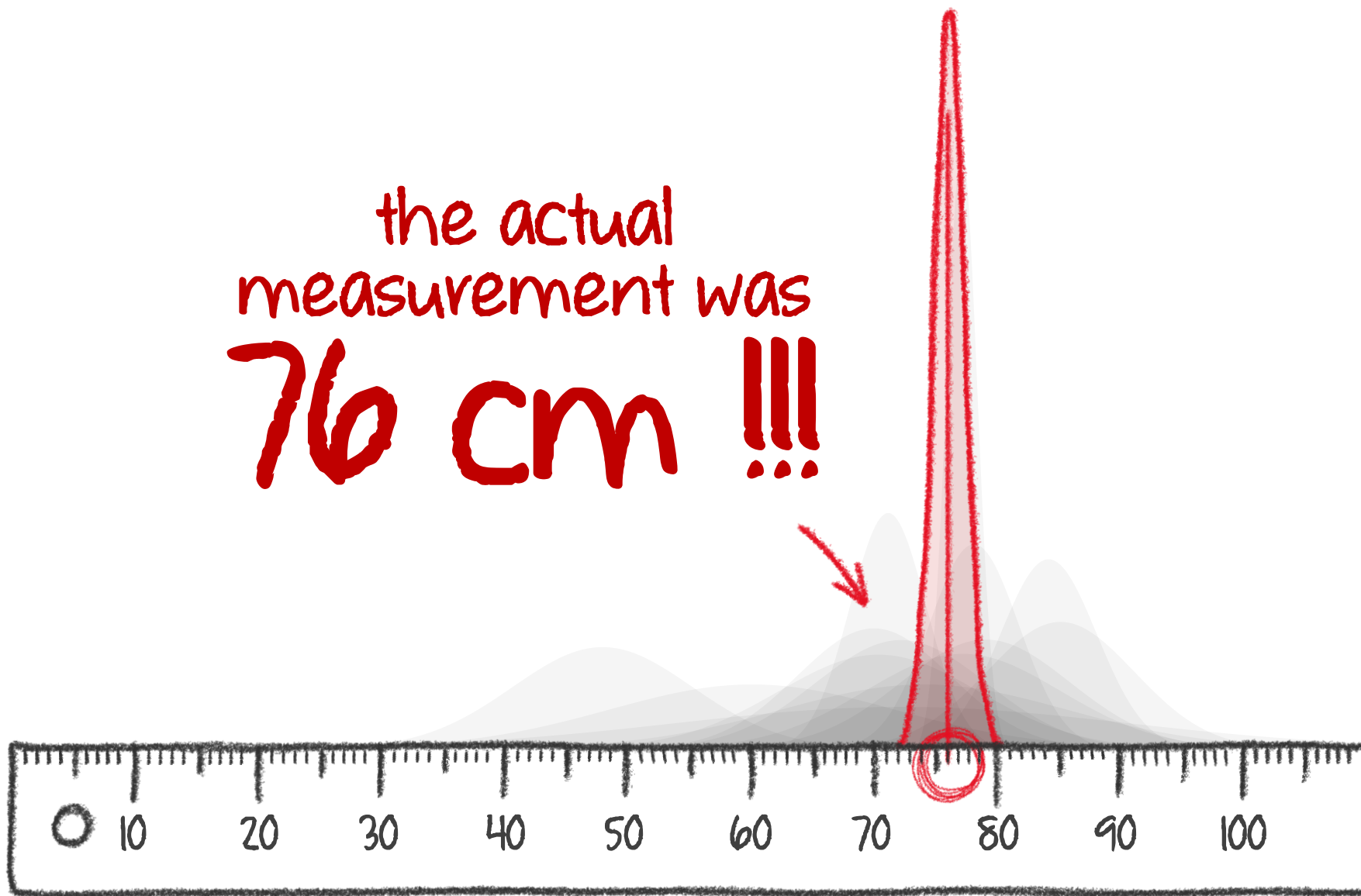


we call this the
posterior
distribution



... sooo ... how long
WAS the diagonal of
the TV screen?

the actual
measurement was
76 cm !!!

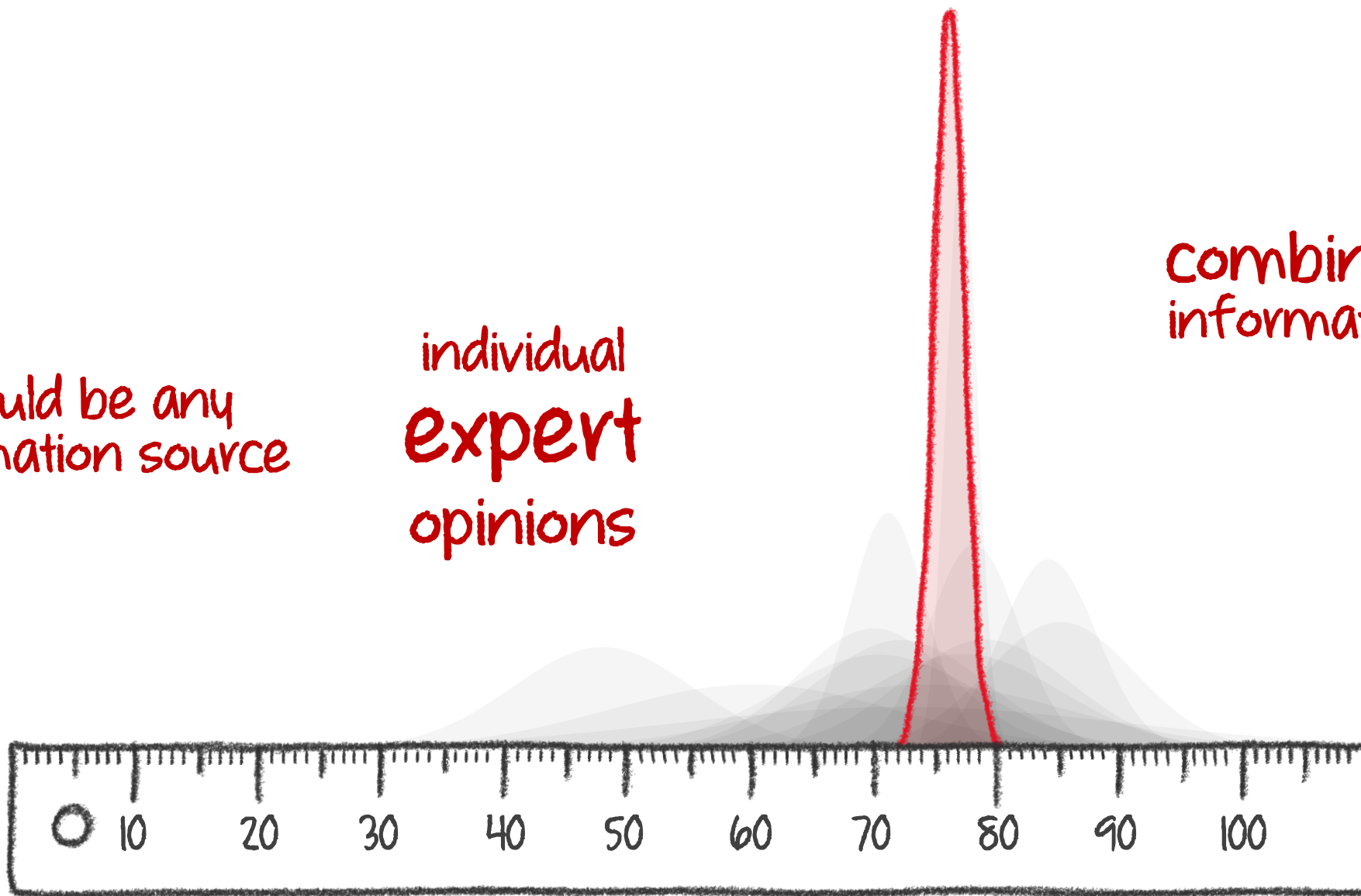


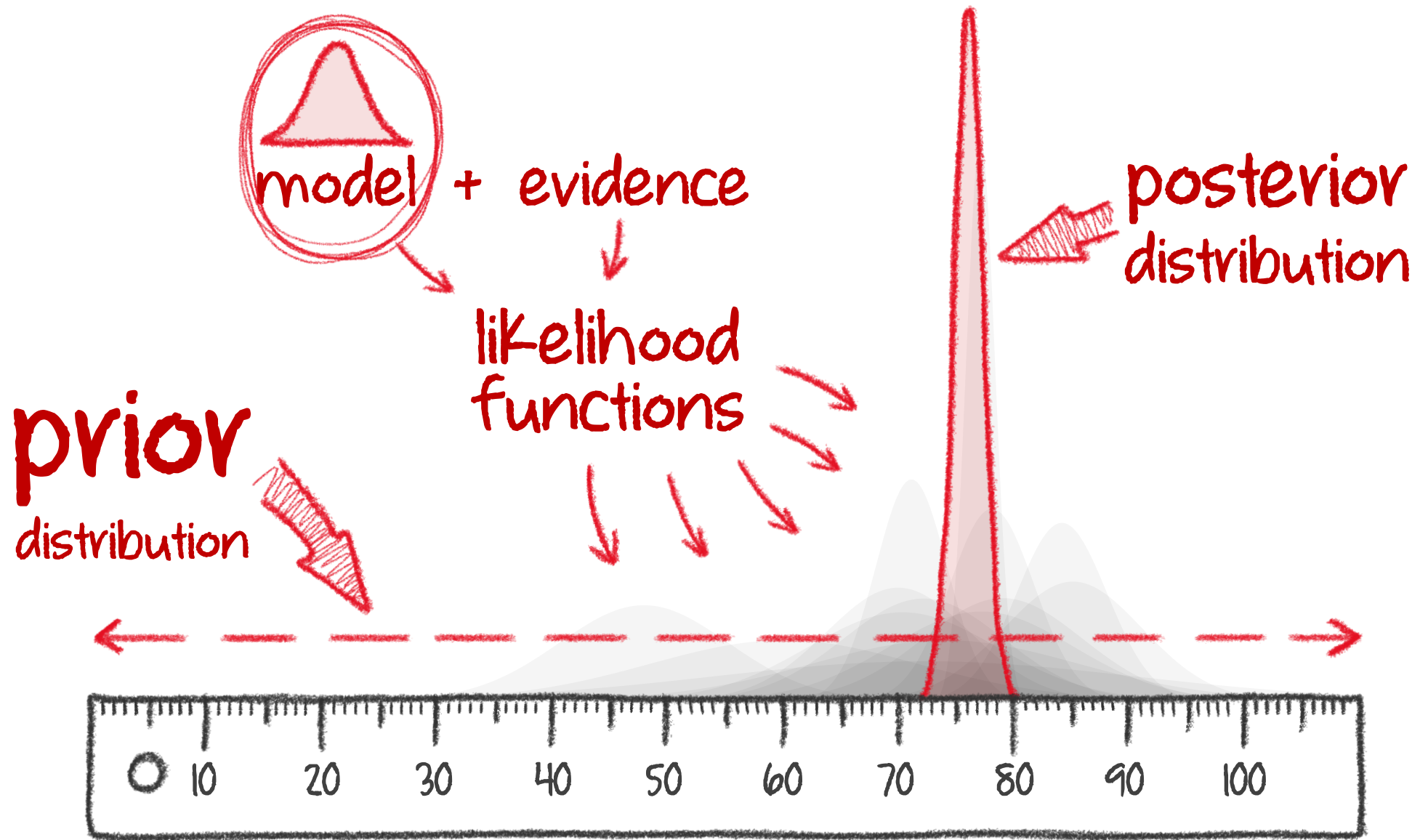
... welcome to
BAYESIAN ANALYSIS

... could be any
information source

individual
expert
opinions

combined
information





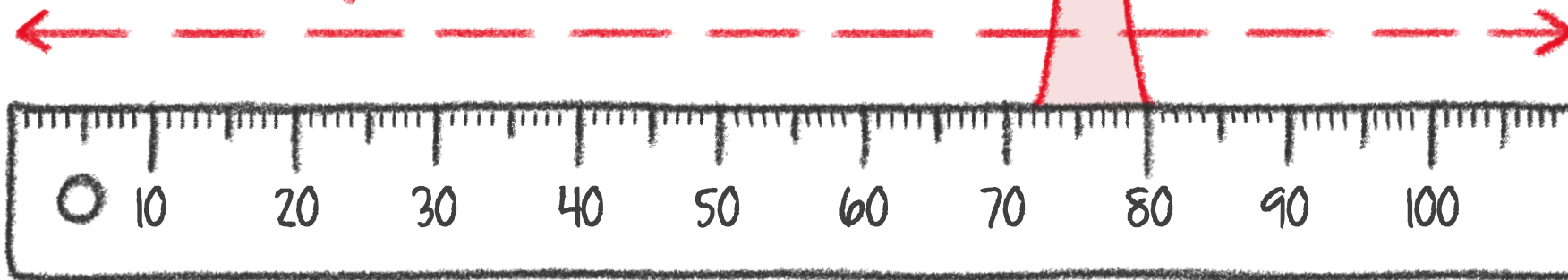
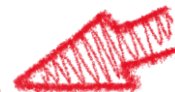
prior understanding
OR
state of knowledge
(SOK)

prior
distribution



updated
understanding
OR
posterior
state of
knowledge
(SOK)

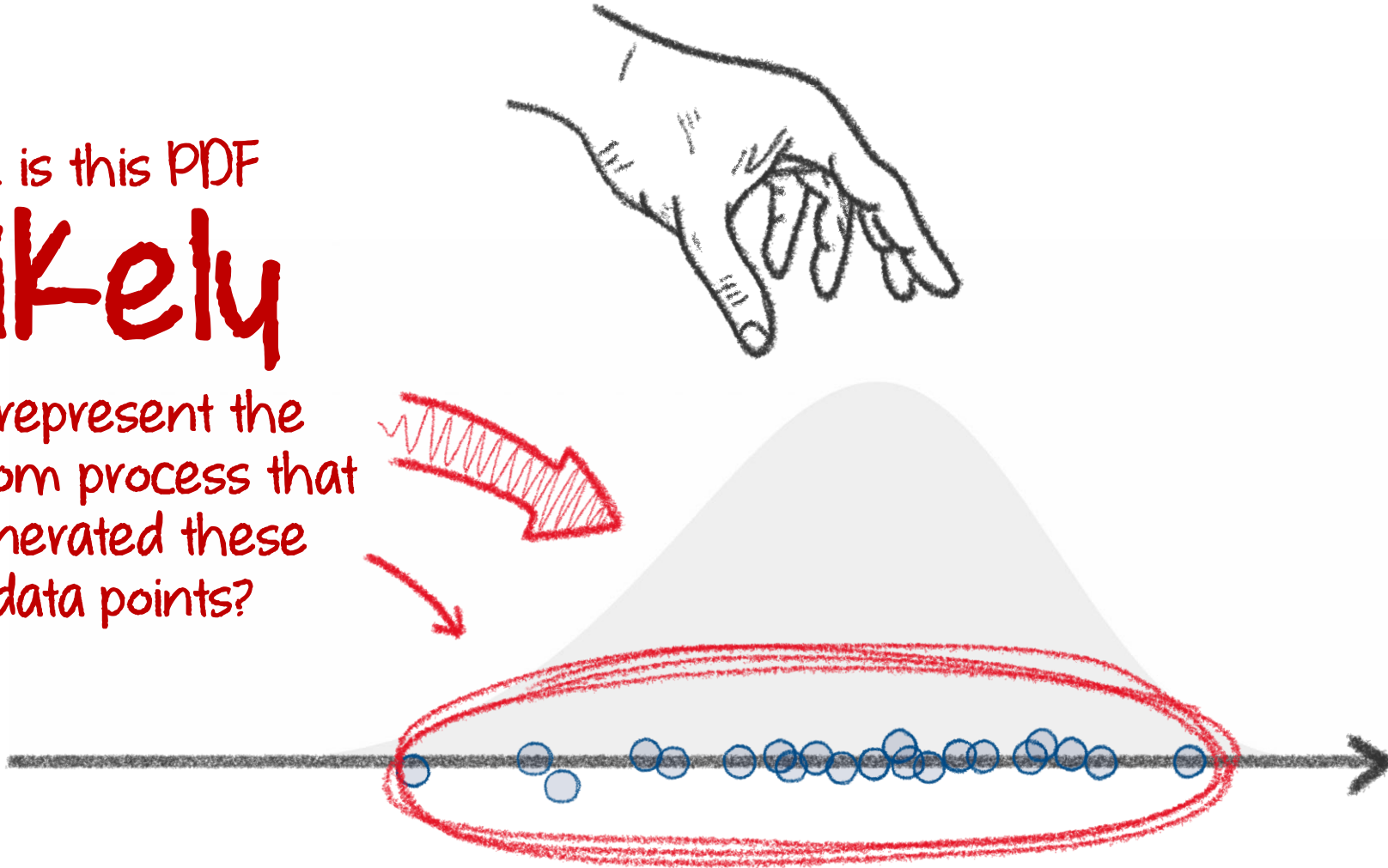
posterior
distribution



... and it all starts
with the *likelihood*

the (random) hand of failure

... is this PDF
likely
to represent the
random process that
generated these
data points?

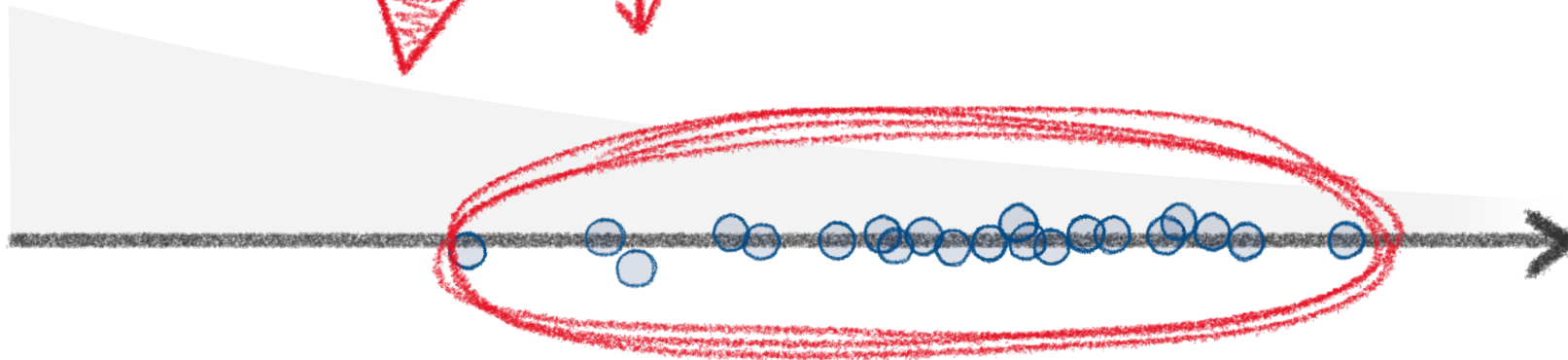


the (random) hand of failure

... is this PDF

less likely

to represent the random
process that generated
these data points?



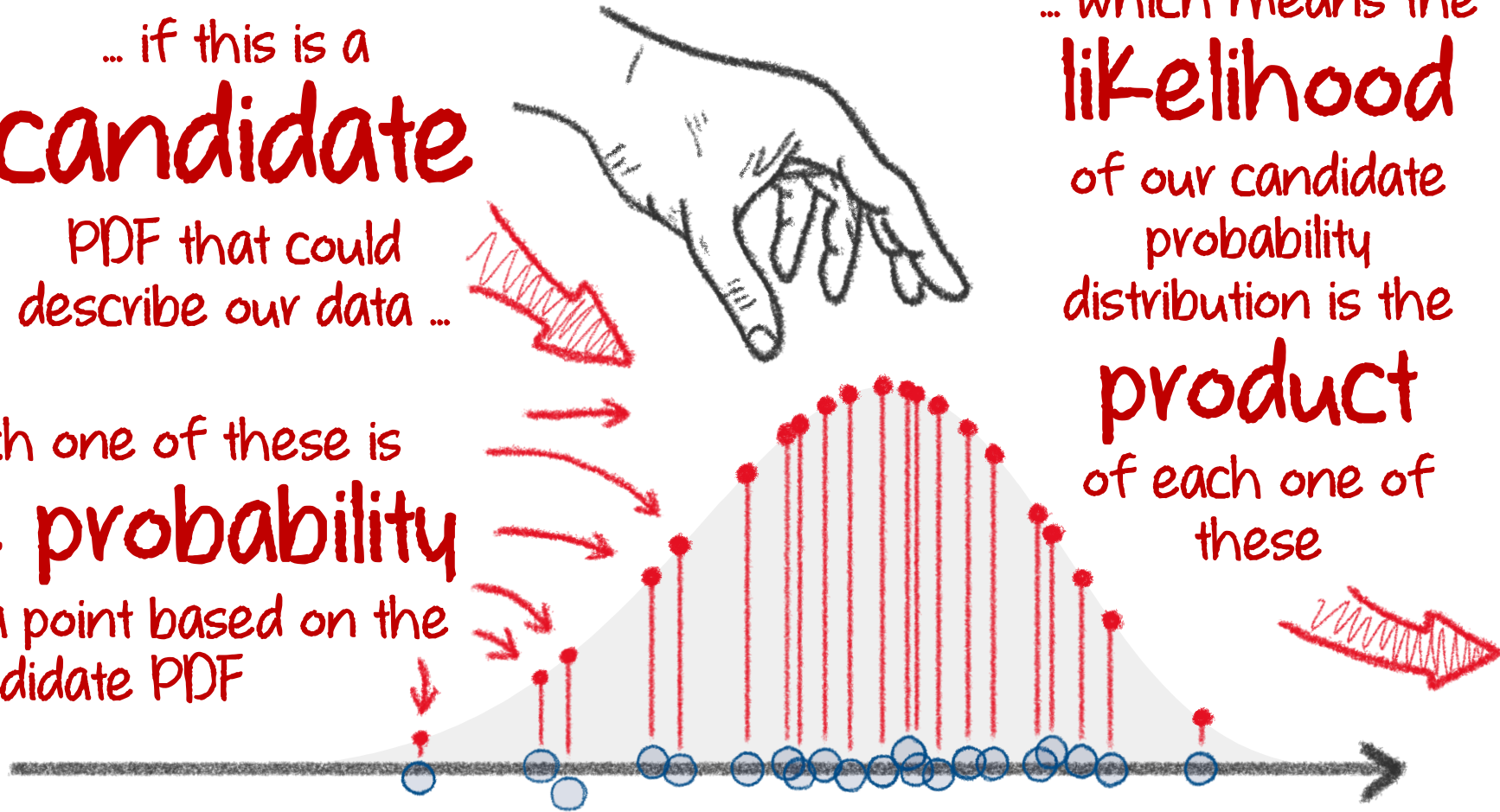
$f(x)$ or the
probability density function (PDF)
gives the relative probability
that a continuous random variable is
equal to a specific value

the (random) hand of failure

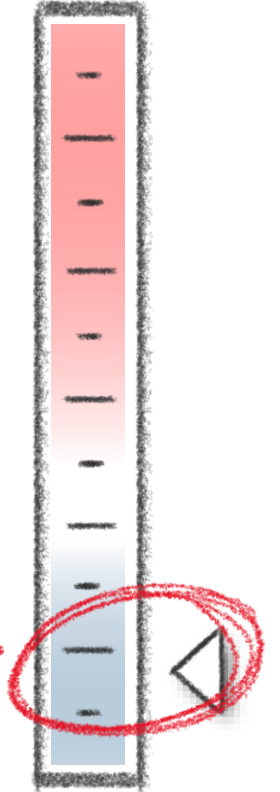
... if this is a
candidate

PDF that could
describe our data ...

... then each one of these is
relative probability
of each data point based on the
candidate PDF



... which means the
likelihood
of our candidate
probability
distribution is the
product
of each one of
these



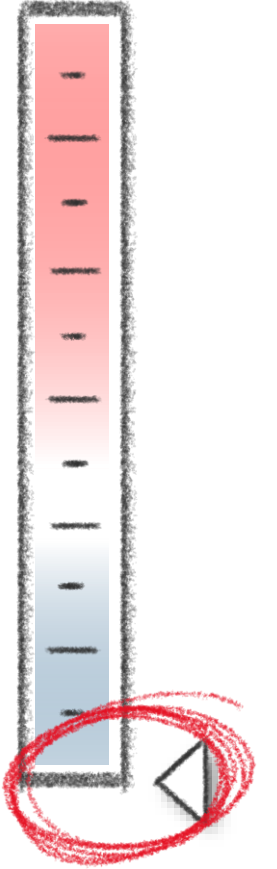
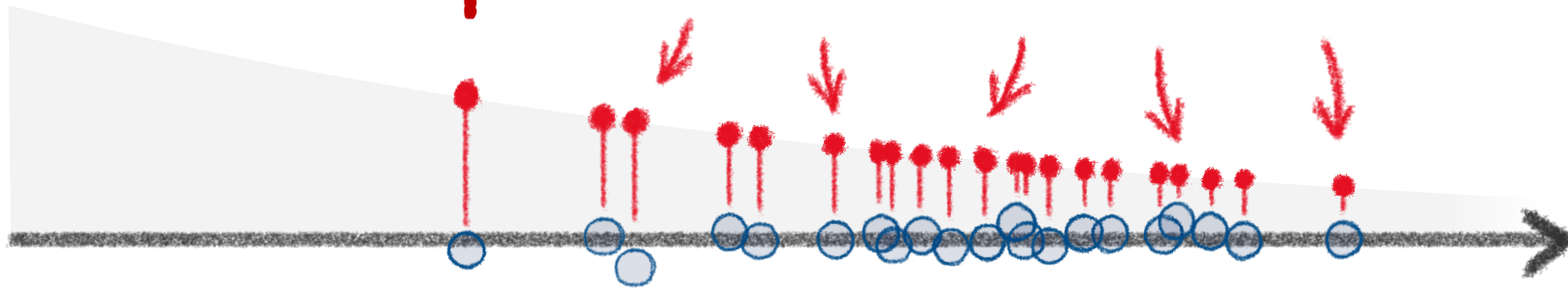
the (random) hand of failure

... the
likelihood

of this
candidate

PDF is the

product of these values



... and it is
very low

... so what is different
about Bayesian
analysis?

... it is with 90 per
cent confidence that
I say that the
mission reliability is
greater than 0.99 ...



... GREAT!

... so there is a 90 %
chance reliability is
greater than 0.99!

... I didn't
say that ...



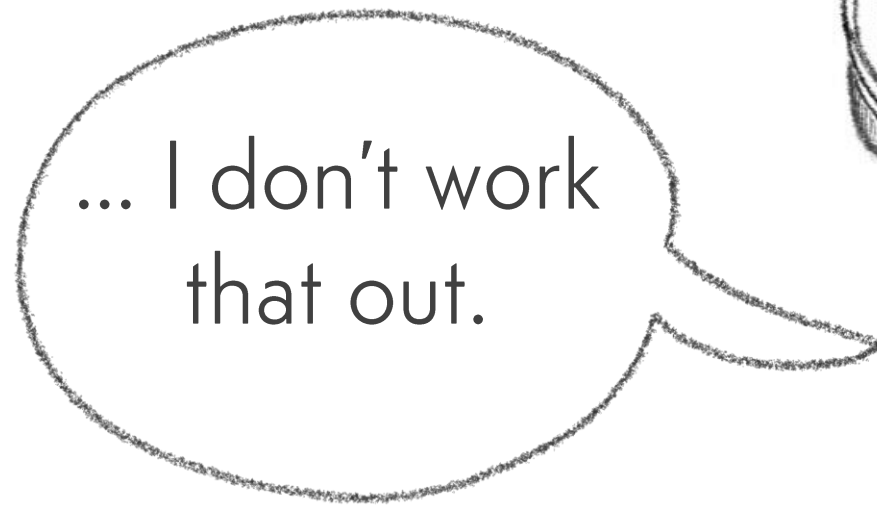


... I SAID ...
... it is with 90 per
cent confidence that
I say that the
mission reliability is
greater than
0.99 ...



what?

... so what is the probability
that mission reliability is
greater than 0.99?





... but for every
10 times I say
something with
'90 % *confidence*'
you would expect
me to be wrong
once.



go away

frequentist probability

... but if you then go and use a 90 %
probability of the reliability exceeding 0.99 in
your business case and decision-making

frequentist probability

... you pretend is equivalent to ...

subjective probability

subjective
probability



... human beings

AND

Bayesian analysis
are all about
subjective
probability

... so if you do this (and
you probably do) then
you are doing a 'weird'
case of Bayesian analysis

... ANY FORM
OF
INFORMATION

expert
judgment

'imperfect'
data

test/ experiment data
ONLY

Bayesian
statistics

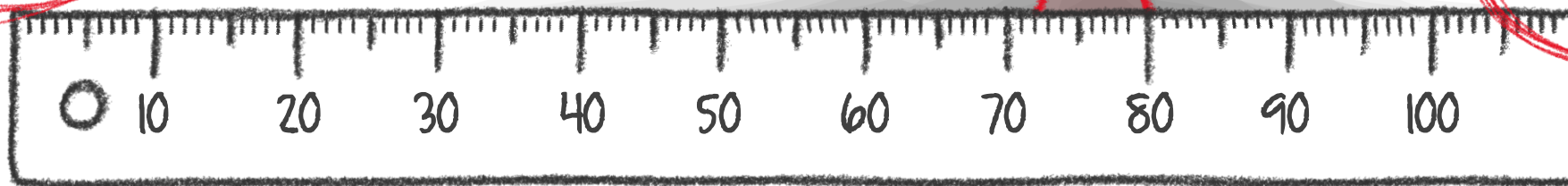
similar
system data

frequentist
(classical)
statistics

test/
experiment
data

ANY
prior distribution

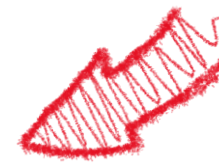
uniform
prior
distribution
ONLY



test/ experiment data
ONLY ↓

frequentist
(classical)
statistics

... that is if you use
the FREQUENTIST
PROBABILITY as if it
is a SUBJECTIVE
PROBABILITY



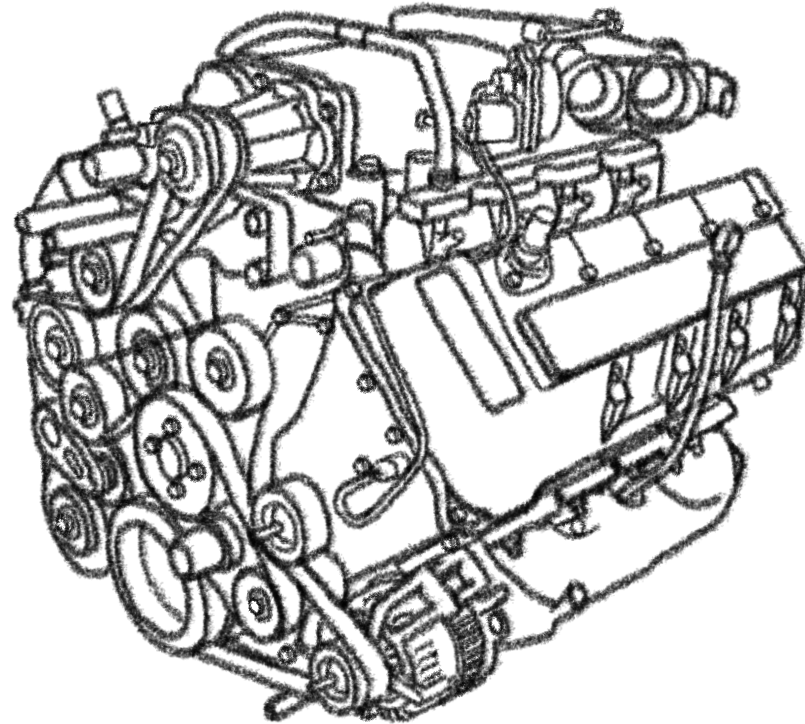
uniform
prior
distribution
ONLY

... so if you do this (and
you probably do) then
you are doing a 'weird'
case of Bayesian analysis

... and Bayesian analysis
can help you solve
A LOT MORE
PROBLEMS

... one test showed
1 out of 20 products
had a defect

5 %



... we sent out a
quick, one question
electronic survey to
1000 customers

... we got 48
negative
responses!

... let's say that our marketing team
believe that there is a

60 %

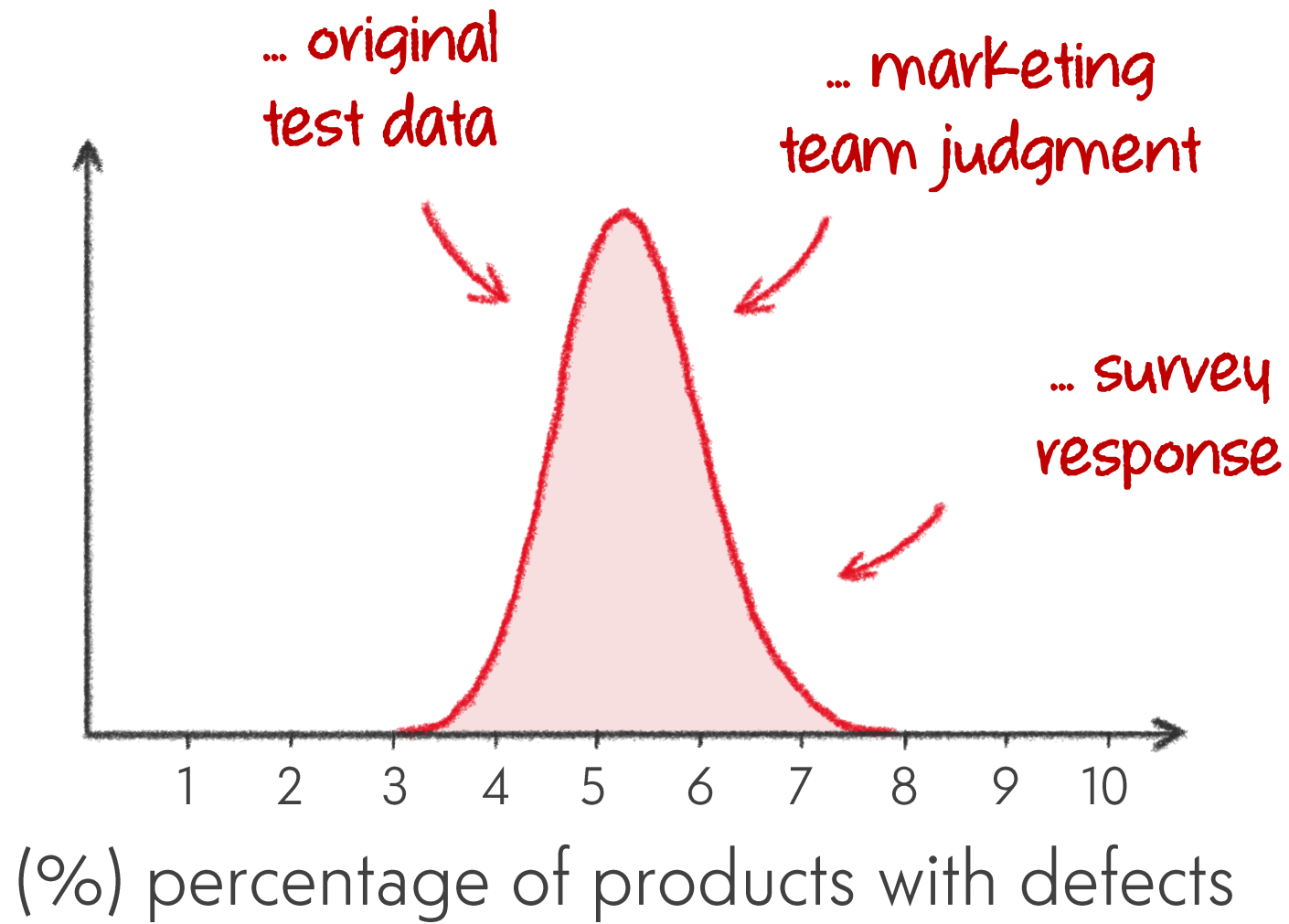
probability that a customer with a
defective product
will write a negative response

... let's say that our marketing team
believe that there is a

1 %

probability that a customer with a
non - defective product
will write a negative response





... we are
surrounded by
information

... I never have
enough data ...



Bayesian statisticians *instead*
complain that we don't use
the information that we have
well enough

