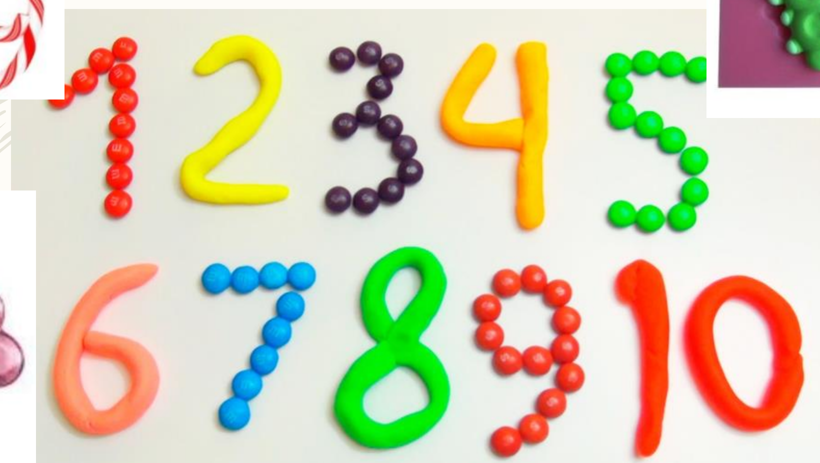
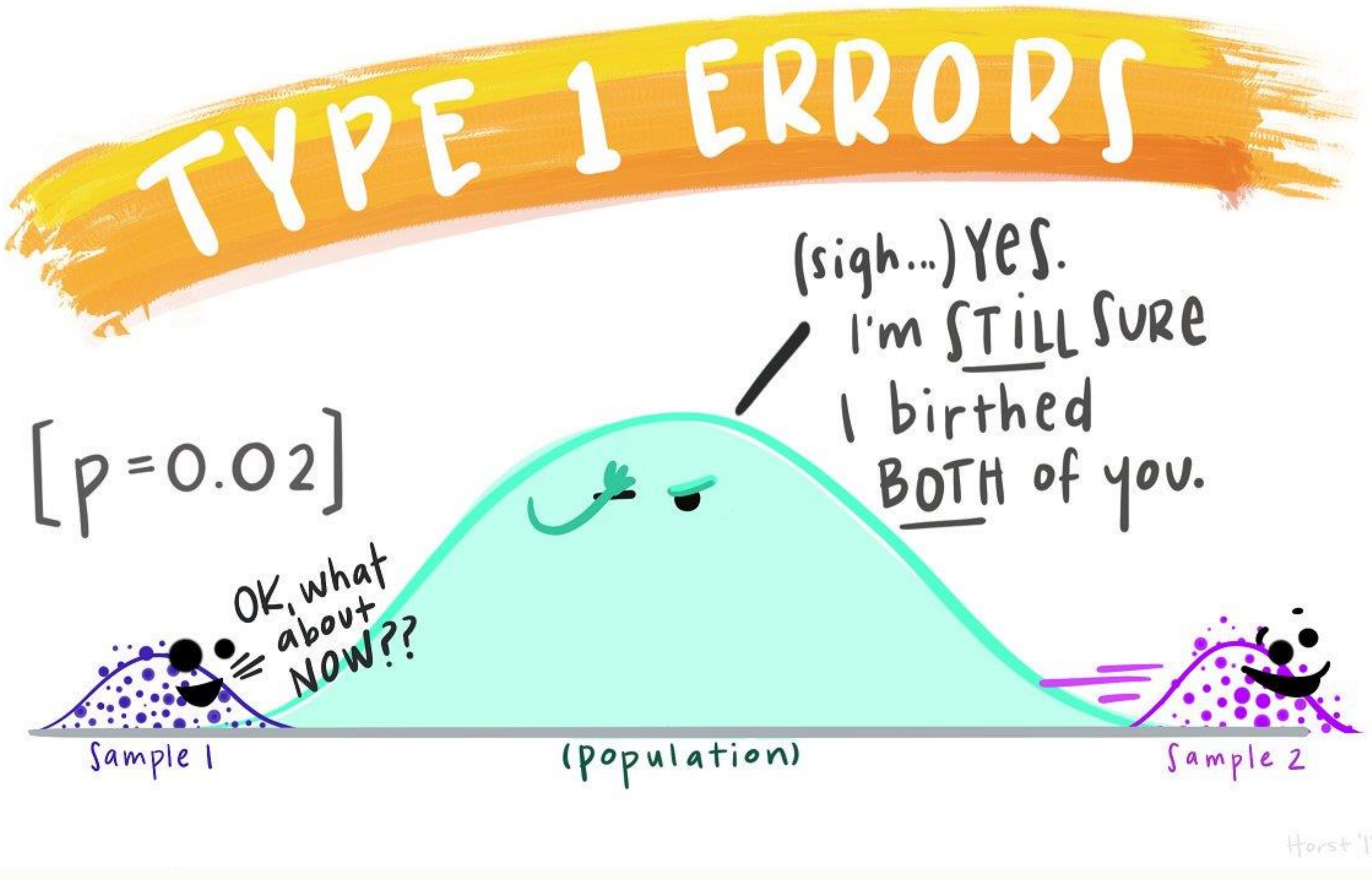
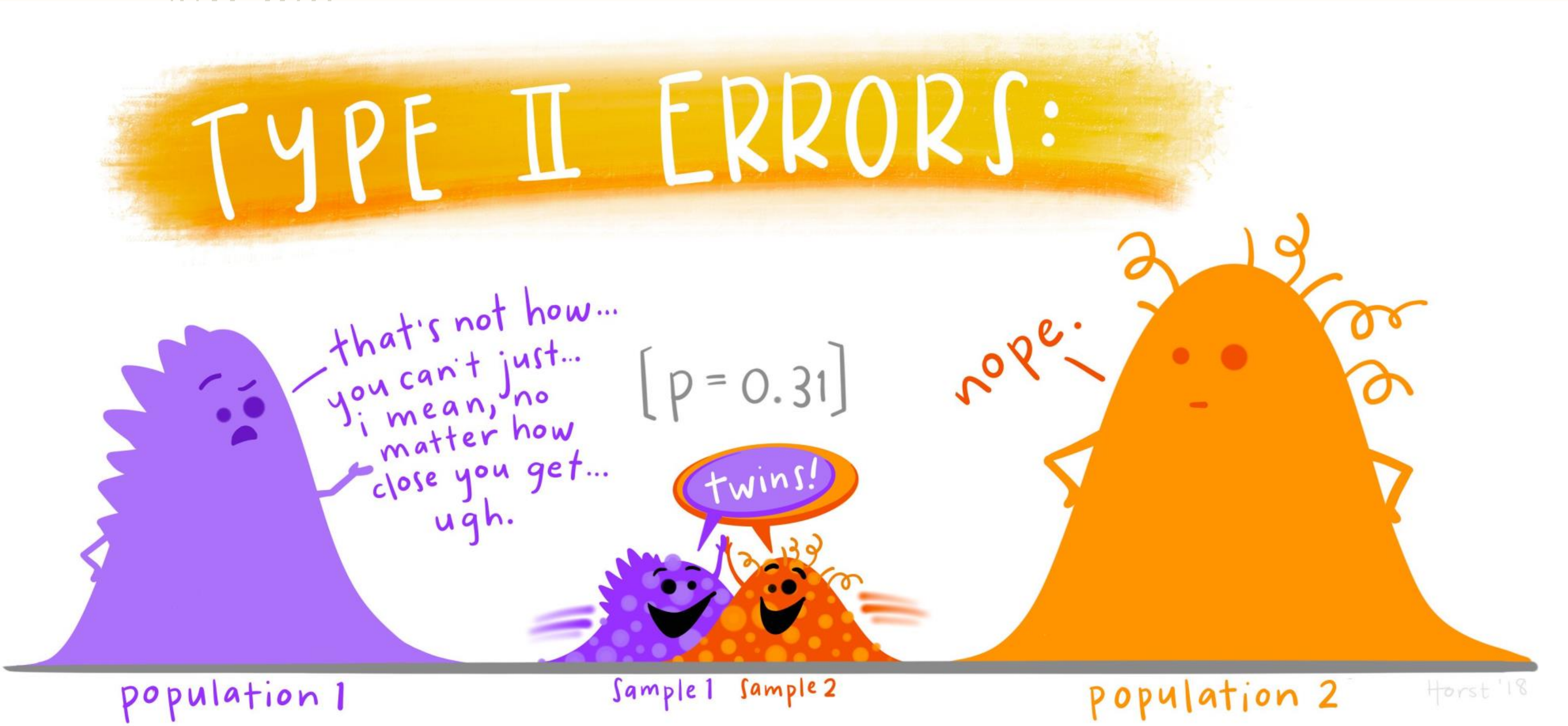
Goodies*

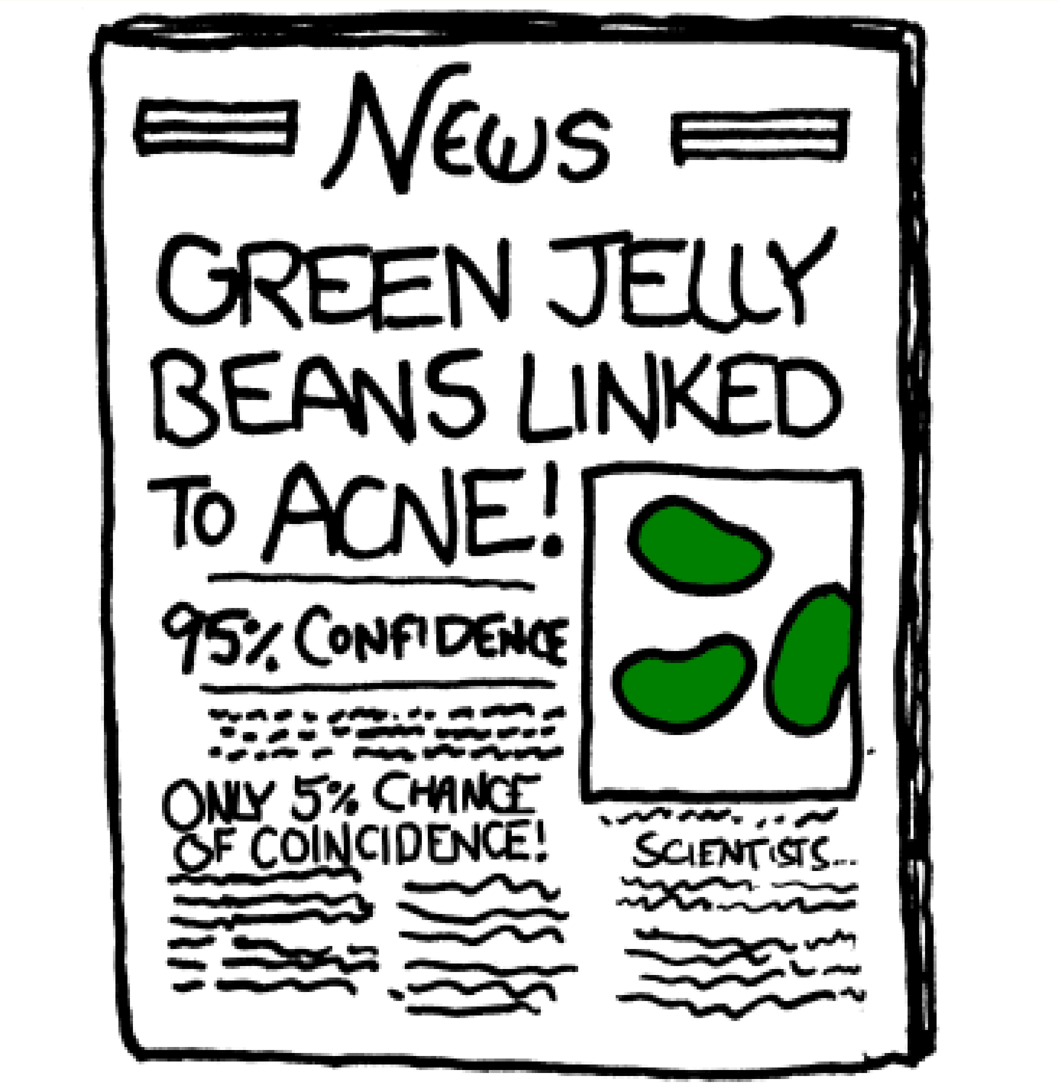


* Goodies related to animals, plants and numbers…


TYPE 1 ERRORS
[p = 0.02]
(sigh...) Yes. I'm STILL sure I birthed BOTH of you.
OK, what about NOW??
Sample 1
(population)
Sample 2
Horst '18

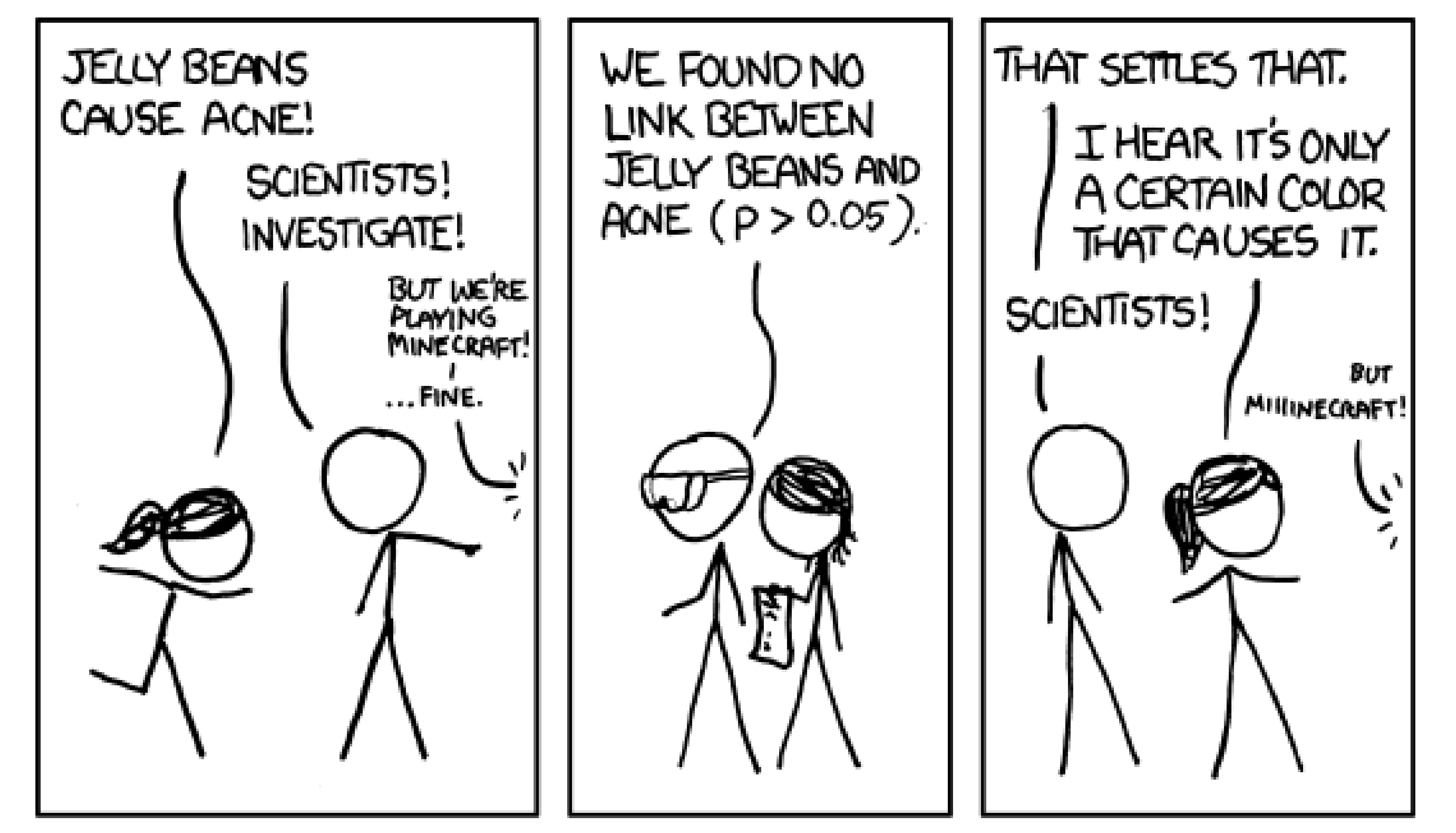


TYPE II ERRORS:
that's not how...
you can't just...
i mean, no
matter how
close you get...
ugh.
[p = 0.31]
twins!
nope.
population 1
sample 1
sample 2
population 2
Horst '18



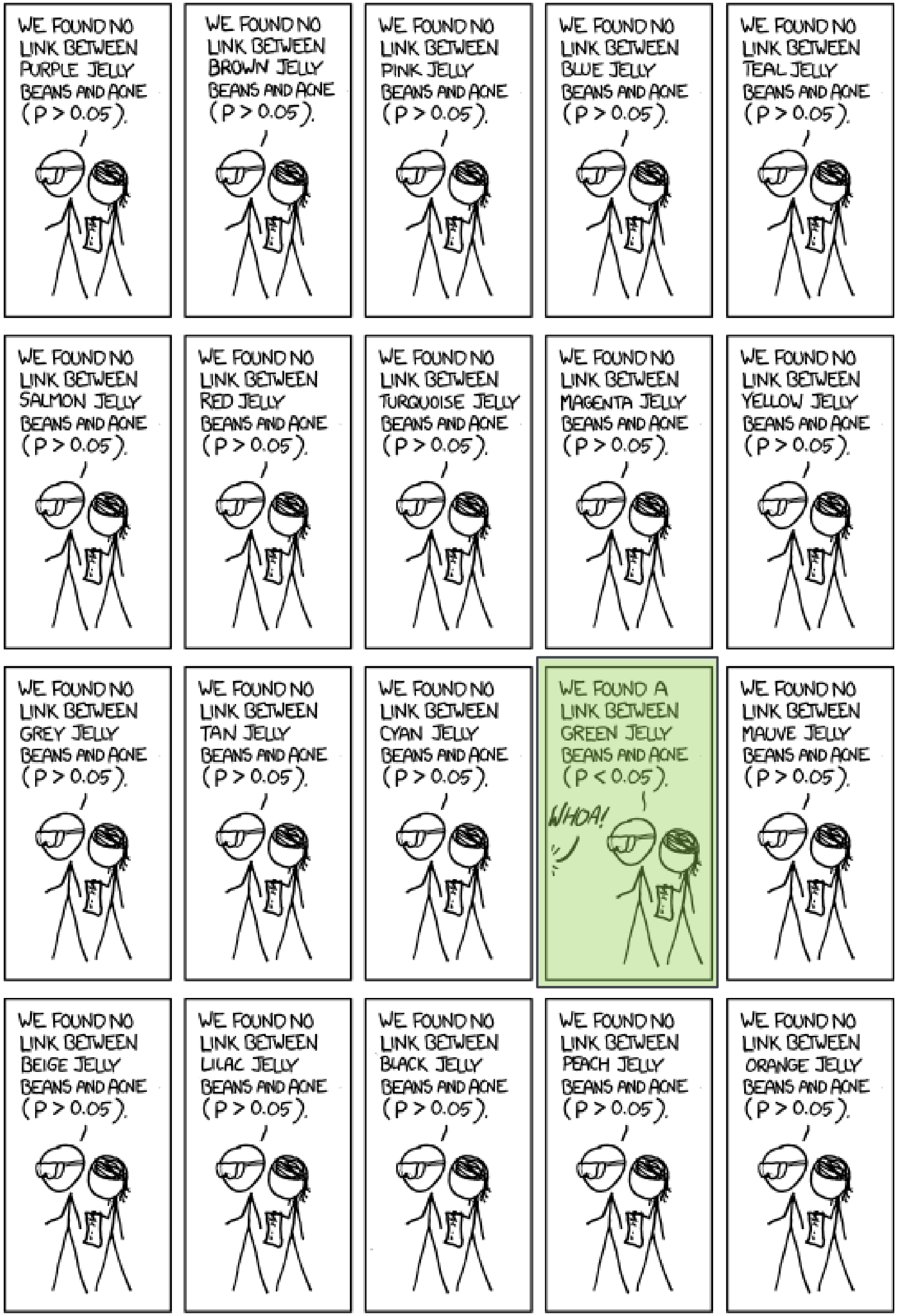
https://xkcd.com/882/

Se não conhecem o xkcd.com… vale a pena explorar!



https://xkcd.com/882/

Se não conhecem o xkcd.com… vale a pena explorar!


WE FOUND NO LINK BETWEEN PURPLE JELLY BEANS AND ACNE (P > 0.05).
WE FOUND NO LINK BETWEEN BROWN JELLY BEANS AND ACNE (P > 0.05).
WE FOUND NO LINK BETWEEN PINK JELLY BEANS AND ACNE (P > 0.05).
WE FOUND NO LINK BETWEEN BLUE JELLY BEANS AND ACNE (P > 0.05).
WE FOUND NO LINK BETWEEN TEAL JELLY BEANS AND ACNE (P > 0.05).
WE FOUND NO LINK BETWEEN SALMON JELLY BEANS AND ACNE (P > 0.05).
WE FOUND NO LINK BETWEEN RED JELLY BEANS AND ACNE (P > 0.05).
WE FOUND NO LINK BETWEEN TURQUOISE JELLY BEANS AND ACNE (P > 0.05).
WE FOUND NO LINK BETWEEN MAGENTA JELLY BEANS AND ACNE (P > 0.05).
WE FOUND NO LINK BETWEEN YELLOW JELLY BEANS AND ACNE (P > 0.05).
WE FOUND NO LINK BETWEEN GREY JELLY BEANS AND ACNE (P > 0.05).
WE FOUND NO LINK BETWEEN TAN JELLY BEANS AND ACNE (P > 0.05).
WE FOUND NO LINK BETWEEN CYAN JELLY BEANS AND ACNE (P > 0.05).
WE FOUND A LINK BETWEEN GREEN JELLY BEANS AND ACNE (P < 0.05).
WHOA!
WE FOUND NO LINK BETWEEN MAUVE JELLY BEANS AND ACNE (P > 0.05).
WE FOUND NO LINK BETWEEN BEIGE JELLY BEANS AND ACNE (P > 0.05).
WE FOUND NO LINK BETWEEN LILAC JELLY BEANS AND ACNE (P > 0.05).
WE FOUND NO LINK BETWEEN BLACK JELLY BEANS AND ACNE (P > 0.05).
WE FOUND NO LINK BETWEEN PEACH JELLY BEANS AND ACNE (P > 0.05).
WE FOUND NO LINK BETWEEN ORANGE JELLY BEANS AND ACNE (P > 0.05).

Editorial

Publication bias: What are the challenges and can they be overcome?

Ridha Joober, MD, PhD; Norbert Schmitz, PhD; Lawrence Annable, Dipstat; Patricia Boksa, PhD

Joober, Boksa — Douglas Mental Health University Institute and Department of Psychiatry, McGill University, Montréal, Que.; Schmitz, Annable — Department of Psychiatry, McGill University Health Centre, Montréal, Que.

Appearances to the mind are of four kinds.
Things either are what they appear to be;
Or they neither are, nor appear to be;
Or they are, and do not appear to be;
Or they are not, and yet appear to be.
Rightly to aim in all these cases
Is the wise man's task.
Epictetus, 2nd century AD

In the last few years, several meta-analyses[1–4] have reappraised the efficacy and safety of antidepressants and concluded that the therapeutic value of these drugs may have been significantly overestimated (see Ioannidis[5]). In some instances, the authors of these meta-analyses resorted to the United States' Freedom of Information Act to obtain unpublished data that, when included in meta-analyses with previously published data, reduced significantly the purported

that they are more likely to be considered for publication by editors, more favourably reviewed by peers and, once published, more likely to be cited. For editors, it is the competition for citation index and the financial survival of journals that makes it more attractive to publish positive findings.

Although publication bias has been documented in the literature for decades and its origins and consequences debated extensively, there is evidence suggesting that this bias is increasing. A recent investigation covering more than 4600 publications from different countries and disciplines found strong evidence for a steady and significant increase in publication bias over the years. The frequency of papers declaring significant statistical support for their a priori formulated hypotheses increased by 22% between 1990 and 2007 ($n = 4656$, $p < 0.001$). Psychology and psychiatry are among the disciplines in which this increase is highest ($p < 0.001$).[7] A

Adicionei ao Fenix

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3341407/

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  - PDFs
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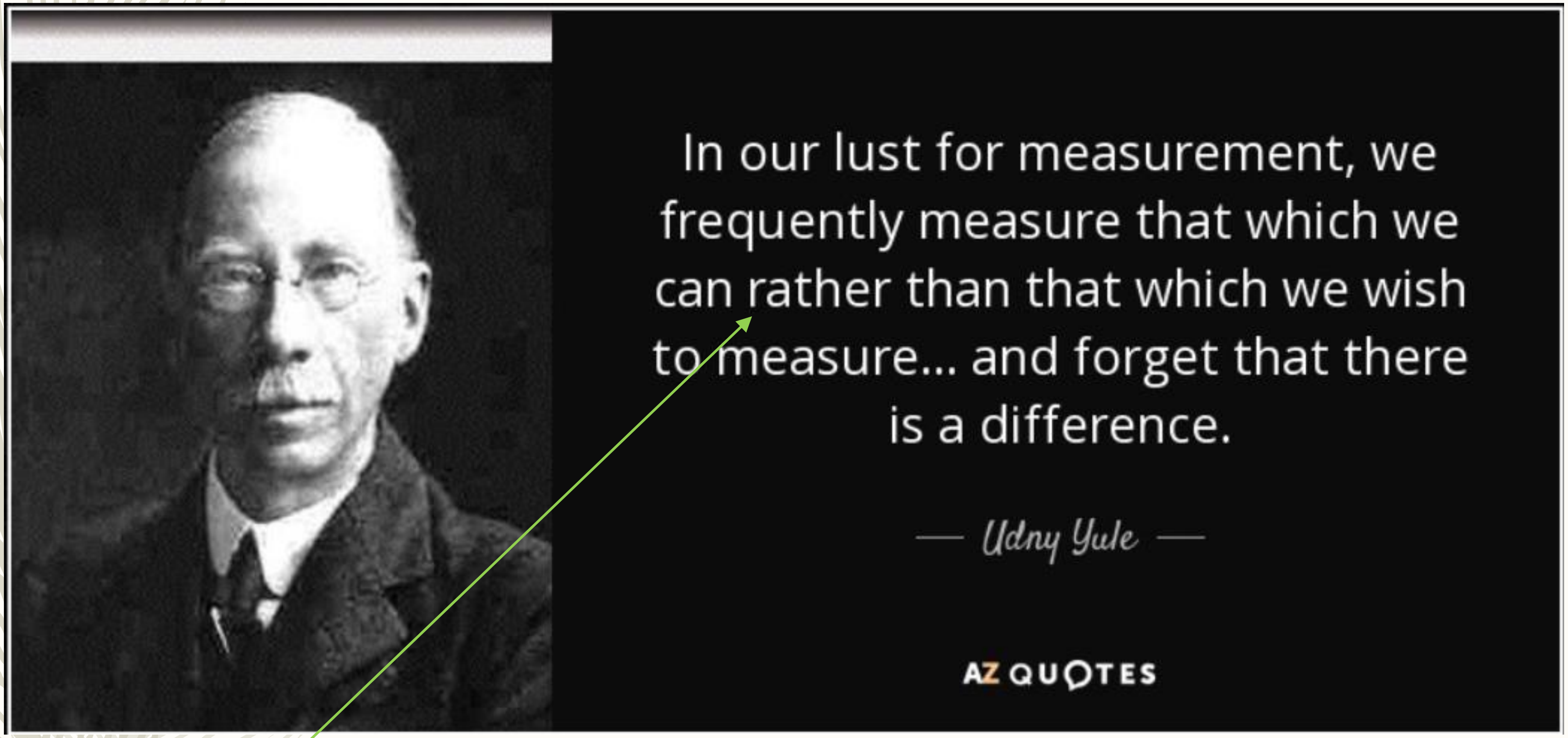
1	Numerical Ecology with R *Borcardetal2001EcologyUseR.pdf*
2	The R Book.pdf
3	Publication bias: What are the challenges and can they be overcome? *jpn-37-149.pdf*

Ecologia Numérica - Aula Teórica 11 – 22-10-2018



https://www.azquotes.com/author/29355

We call that a **proxi**! – not really what we want, but we hope correlated enough with what we want that will allow useful inferences. As an example, latitude and longitude are often used as proxies for environmental relevant covariates

Para garantir os mesmos resultados em qualquer computador

```
> set.seed(123)
> t.test(rnorm(50),mu=0)

        One Sample t-test

data:  rnorm(50)
t = 0.26275, df = 49, p-value = 0.7938
alternative hypothesis: true mean is not equal to 0
95 percent confidence interval:
 -0.2287258  0.2975329
sample estimates:
 mean of x
0.03440355

> t.test(rnorm(50),mu=1)

        One Sample t-test

data:  rnorm(50)
t = -6.6661, df = 49, p-value = 2.184e-08
alternative hypothesis: true mean is not equal to 1
95 percent confidence interval:
 -0.1109170  0.4037335
sample estimates:
mean of x
0.1464083

> 2*pt(-6.6661,49)
[1] 2.183586e-08
```

Teste t para 1 amostra

Pressupostos do teste *t*:

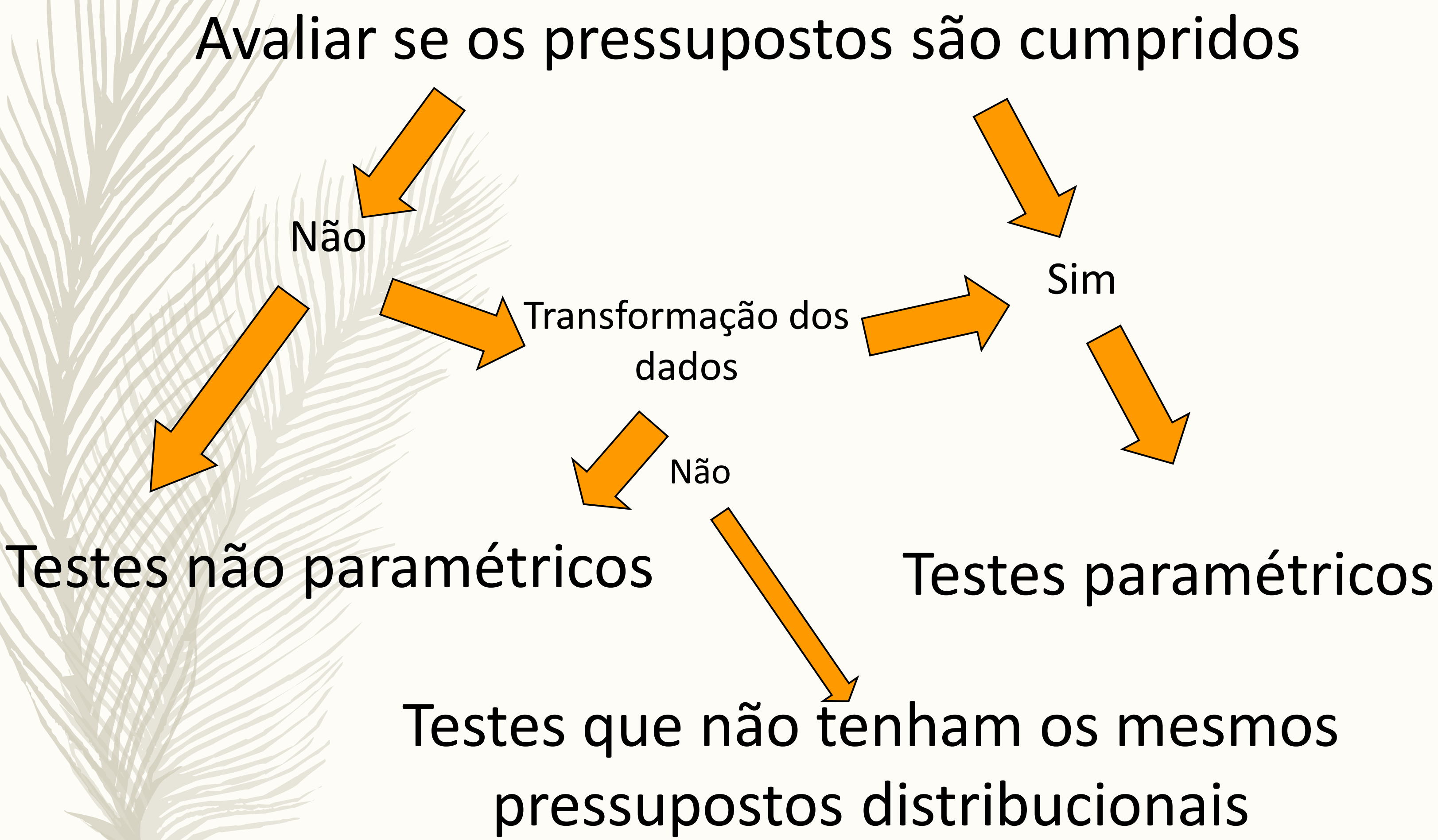
Dados provenientes duma população normal

Como verificar os pressupostos?

Aula anterior!!!

O que fazer se não forem cumpridos?

avaliação de pressupostos



Teste sobre o valor médio com base em uma amostra

Avaliar se os pressupostos são cumpridos

Não

Sim

Transformação dos dados

Não

Testes não paramétricos

Teste de Wilcoxon

Testes paramétricos

Teste de t

Teste a uma amostra: abordagem não-paramétrica

Teste de Wilcoxon

Hipóteses:

H_0: $\mu = Y$

H_1: $\mu \neq Y$

Estatística de teste:

$$T^{+} = \sum (R_i \text{ para os quais } D_i^{*} \text{ são positivos})$$

$D^{*}_{i} = X_i - Y$ R_i = ordem atribuída a D_i ($D_i = |\, D^{*}_{i} \,|$)

Teste a uma amostra: abordagem não-paramétrica

Teste de Wilcoxon

Hipóteses:	Critério de decisão: Rejeitar H_0 se
H_0: $\mu = Y$ vs. H_1: $\mu \neq Y$	$T^+ > w_{1-\alpha/2}$ ou $T^+ < w_{\alpha/2}$
H_0: $\mu \geq Y$ vs. H_1: $\mu < Y$	$T^+ > w_{1-\alpha}$
H_0: $\mu \leq Y$ vs. H_1: $\mu > Y$	$T^+ < w_{\alpha}$

w_α é o quantil da distribuição da estatística de Wilcoxon

Teste a uma amostra: abordagem não-paramétrica

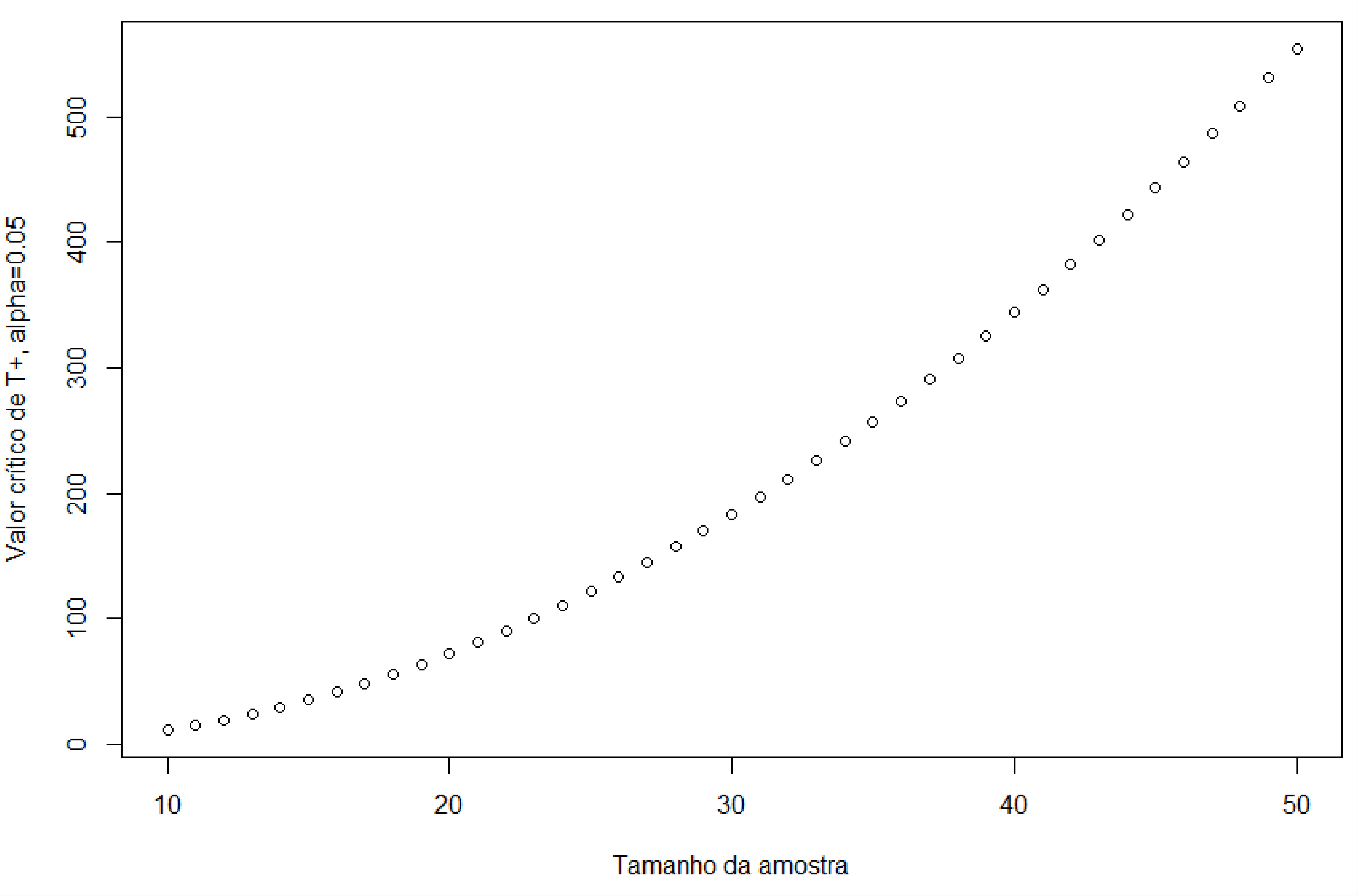
Teste de Wilcoxon

w_α é o quantil da distribuição da estatística de Wilcoxon
(**fundamental**: apenas depende de n e do nível de significância pretendido!)

$$w_i \cong \frac{n(n+1)}{4} + z_i \sqrt{n(n+1)(2n+1)/24}$$

Mas na realidade isto só era util antigamente, porque era uma formula fechada que aproximava a distribuição; hoje em dia é simples obter a distribuição exata!

```
getTplus=function(n,alpha=0.05){
  #this function returns the quantile that defines the rejection area for the Wilcoxon test
  tplus=n*(n+1)/4+qnorm(alpha,0,1)*sqrt(n*n+1*(2*n+1)/24)
  return(tplus)}
plot(10:50,getTplus(10:50,0.05),ylab="Valor crítico de T+, alpha=0.05",xlab="Tamanho da amostra")
```



Uma representação da expressão anterior, assumindo α=0.05

Exemplo: amostra de tamanho 8

$$D^*_i = X_i - Y$$

$$R_i = \text{ordem atribuída a } D_i \; (D_i = | D^*_i |)$$

H0: $\mu=2$ vs. H1: $\mu\neq2$

Dados: 2.2, 2.8, 1.1, 4.3, 2.5, 5.6, 0.3, 1.9

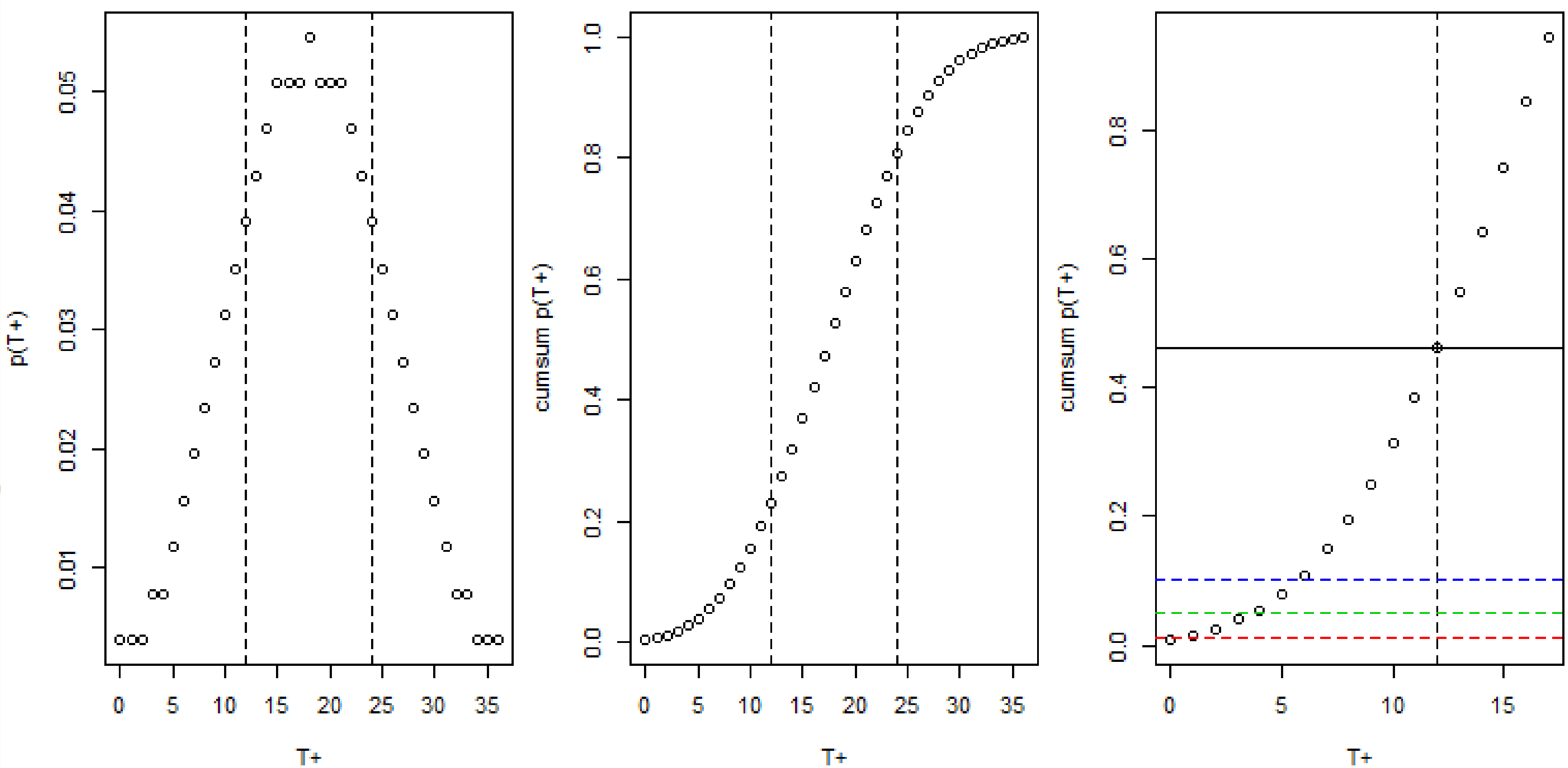
Xi	D^*_i=Xi-μ	Sinal de D^*_i	D_i
2.2	2.2-2=0.2	+	0.2
2.8	2.8-2=0.8	+	0.8
1.1	1.1-2=-0.9	-	0.9
4.3	4.3-2=2.3	+	2.3
2.5	2.5-2=0.5	+	0.5
5.6	5.6-2=3.6	+	3.6
0.3	0.3-2=-1.7	-	1.7
1.9	1.9-2=-0.1	-	0.1

Sort D_i	R_i=Rank D_i	Sinal de D^*_i
0.1	1	-
0.2	2	+
0.5	3	+
0.8	4	+
0.9	5	-
1.7	6	-
2.3	7	+
3.6	8	+

T^+=2+3+4+7+8 (and T-=1+5+6=12)

Sob H0, qual seriam os valores possiveis para T+? mínimo 0, máximo 36, a distribuição é simétrica (média 18), valor mais provável para T+ é 18! Será 24 extremo?

(para um teste bilateral) $T^+=24$ é o mesmo que $T^-=12$




```
> wilcox.test(c(2.2,2.8,1.1,4.3,2.5,5.6,0.3,1.9),mu=2)

        Wilcoxon signed rank test

data:  c(2.2, 2.8, 1.1, 4.3, 2.5, 5.6, 0.3, 1.9)
V = 24, p-value = 0.4609
alternative hypothesis: true location is not equal to 2
```

```
> 2*psignrank(q=12,n=8)
[1] 0.4609375
```

wilcox.test(
x=dados,
mu=valor da medida de localização central
em torno do qual a distribuição da estatistica de teste sob H0 é simétrica,
alternative =tipo de teste com opções possiveis "two.sided", "less", "greater")

```
> wilcox.test(rnorm(50),mu=0)

        Wilcoxon signed rank test with continuity correction

data:  rnorm(50)
V = 627, p-value = 0.9231
alternative hypothesis: true location is not equal to 0
```

```
> 2*psignrank(q=627,n=50)
[1] 0.9237814
```

```
> wilcox.test(rnorm(50),mu=0,alternative = "greater")

        Wilcoxon signed rank test with continuity correction

data:  rnorm(50)
V = 702, p-value = 0.2684
alternative hypothesis: true location is greater than 0
```

```
> psignrank(q=702,n=50,lower=FALSE)
[1] 0.2667856
```

```
> wilcox.test(rnorm(50),mu=0,alternative = "less")

        Wilcoxon signed rank test with continuity correction

data:  rnorm(50)
V = 608, p-value = 0.3898
alternative hypothesis: true location is less than 0
```

```
> psignrank(q=608,n=50)
[1] 0.3906967
```

Podemos criar o nosso próprio teste estatístico!

H_0: μ=Y

Wilcoxon: Estatística de teste

$$T^+ = \sum (R_i \text{ para os quais } D_i^* \text{ são positivos})$$

É uma quantidade que sob H0 tem a distribuição conhecida (depende de n)... e como tal que nos permite calcular a probabilidade de um valor observado se H0 for verdadeira. Mas há outras possíveis estatísticas de teste!

Exemplos:

1. Número de valores na amostra maiores que o valor Y
2. Soma das ordens dos valores maiores que Y
3. Quantas vezes é que o máximo-mínimo, 2º máximo - 2º mínimo,..., n/2 º máximo – n/2 º mínimo maior que Y
4. Alguém consegue inventar uma?

Teste para comparação de duas amostras