

# **Improving Your Statistical Inferences**

**Chinese Translation**

Daniël Lakens

# Table of contents

<b>Overview</b>	<b>3</b>
<b>1 <math>p</math></b>	<b>4</b>
1.1 $p$ . . . . .	4
1.2 . . . . .	5
1.3 $p$ Calculating a $p$ -value . . . . .	40
1.4 $p$ . . . . .	43
1.5 . . . . .	57
1.6 $p$ . . . . .	60
1.7 Preventing common misconceptions about $p$ -values . . . . .	62
1.7.1 1 $p$ . . . . .	71
1.7.2 2 $p$ . . . . .	77
1.7.3 3 $p$ . . . . .	83
1.7.4 4 5% . . . . .	83
1.7.5 5 1 $p$ . . . . .	87
1.8 . . . . .	89
1.8.1 $p$ . . . . .	91
1.8.2 . . . . .	94
<b>References</b>	<b>95</b>

# Overview

You can cite this resource as:

Lakens, D. (2022). Improving Your Statistical Inferences. Retrieved from [https://lakens.github.io/statistical\\_inferences/](https://lakens.github.io/statistical_inferences/)  
<https://doi.org/10.5281/zenodo.6409077>



Daniël Lakens

Eindhoven University of Technology

1 *p*

*ordinal claim* , “ A

Gosset “student” *t* *p* *p* “ ”  
1904 (1904)

Benjamini 2016 *p* *p*

< 0.05 /

1.1 *p*

*p* *p* *p*

*p* Ronald Fisher1925 *p* Fisherian *p*  
(Greenland et al., 2016) 1 0 “ ” *p* Fisher (1956) *p* Fish  
(1992) ” “ Fisher ” (Schweder & Hjort, 2016) Fisherian *p*

Neyman Pearson (1933) William Gosset Ronald Fisher P Fisher  
Pearson Fisherian Neyman-  
Pearson Dienes (2008) Neyman-Pearson “ ”

Neyman-Pearson *p*  $\alpha$  0.01  $\alpha$  *p*=0.006 *p*=0.000001 Fisherian *p*  
Pearson Neyman (1957)

The content of the

Neyman-Pearson Neyman “ ” Neyman

“ ” 1957 10

Cox (1958) :

” ”

Neyman-Pearson *p* (Hempel,  
1966) Ishihara test

Table 1.1:

	Daniel	Kyra
friend_1	9	9
friend_2	7	6
friend_3	8	7
friend_4	9	8
friend_5	8	7
friend_6	9	9
friend_7	9	8
friend_8	10	8
friend_9	9	8
friend_10	9	7

## 1.2

10                      LOTR                      20      10                      1~10                      8.7                      7.7

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e7>



Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>



Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9a>



Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call.graphics(C\_text, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call.graphics(C\_text, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call.graphics(C\_text, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call.graphics(C\_text, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call.graphics(C\_text, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call.graphics(C\_text, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call.graphics(C\_text, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call.graphics(C\_text, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call.graphics(C\_text, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Daniel ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e5>



Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <84>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8f>

Warning in grid.Call(C\_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call.graphics(C\_text, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call.graphics(C\_text, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in grid.Call.graphics(C\_text, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <84>

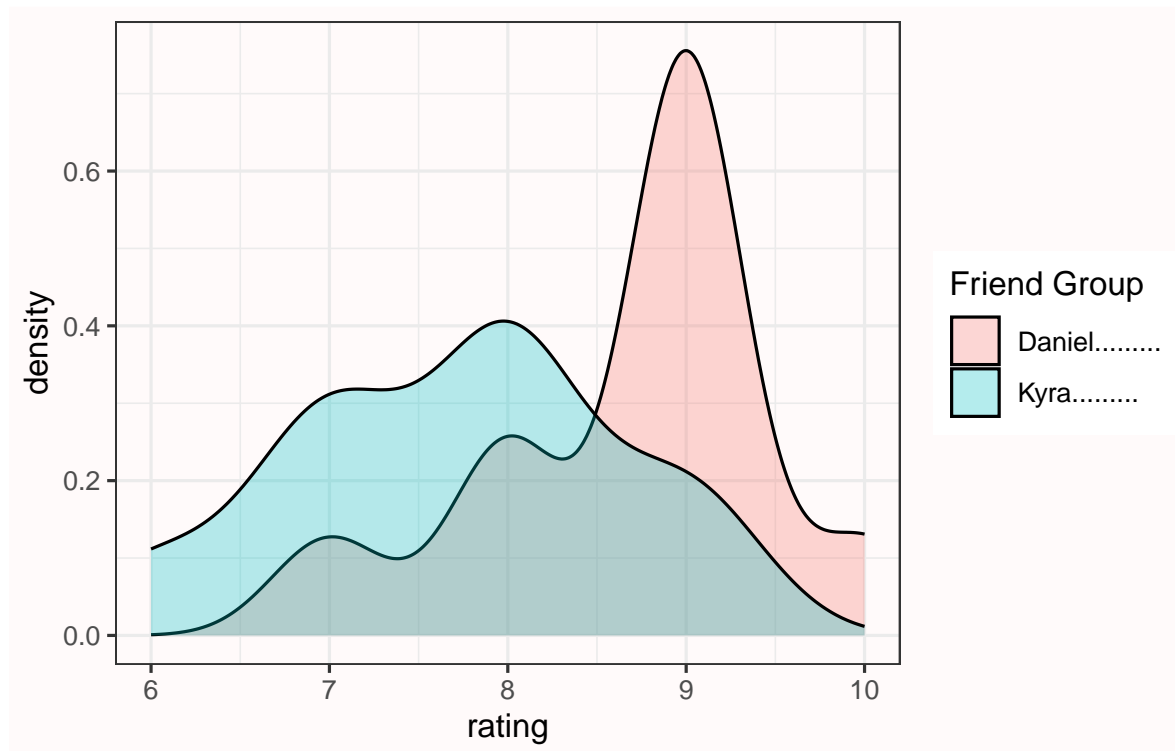
Warning in grid.Call.graphics(C\_text, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in grid.Call.graphics(C\_text, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <9c>

Warning in grid.Call.graphics(C\_text, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in grid.Call.graphics(C\_text, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call.graphics(C\_text, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8f>



Warning in grid.Call.graphics(C\_text, as.graphicsAnnot(x\$label), x\$x, x\$y, :  
conversion failure on 'Kyra ' in 'mbcsToSbcs': dot substituted for <8b>

1 LOTR  
1  
0 0  
t t  
t df 18 t 20 df=N-2 t=2.5

### 1.3 $p$ Calculating a $p$ -value

$t$   $t$   $p$   $t$   $t$  2.5175  $p$  0.02151

```
t.test(df_long$rating ~ df_long$`Friend Group`, var.equal = TRUE)
```



## Two Sample t-test

```
data: df_long$rating by df_long$`Friend Group`  
t = 2.5175, df = 18, p-value = 0.02151  
alternative hypothesis: true difference in means between group Daniel and group Kyra is n  
95 percent confidence interval:  
 0.1654875 1.8345125  
sample estimates:  
mean in group Daniel      mean in group Kyra  
          8.7              7.7
```

```
t    df=18    t 2.5175 -2.5175
```

```
Warning in title(...): conversion failure on 't ' in 'mbcsToSbcs': dot  
substituted for <e5>
```

```
Warning in title(...): conversion failure on 't ' in 'mbcsToSbcs': dot  
substituted for <80>
```

```
Warning in title(...): conversion failure on 't ' in 'mbcsToSbcs': dot  
substituted for <bc>
```

```
Warning in title(...): conversion failure on 't ' in 'mbcsToSbcs': dot  
substituted for <e5>
```

```
Warning in title(...): conversion failure on 't ' in 'mbcsToSbcs': dot  
substituted for <88>
```

```
Warning in title(...): conversion failure on 't ' in 'mbcsToSbcs': dot  
substituted for <86>
```

```
Warning in title(...): conversion failure on 't ' in 'mbcsToSbcs': dot  
substituted for <e5>
```

```
Warning in title(...): conversion failure on 't ' in 'mbcsToSbcs': dot  
substituted for <b8>
```

```
Warning in title(...): conversion failure on 't ' in 'mbcsToSbcs': dot  
substituted for <83>
```

Warning in title(...): conversion failure on 't ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in title(...): conversion failure on 't ' in 'mbcsToSbcs': dot substituted for <80>

Warning in title(...): conversion failure on 't ' in 'mbcsToSbcs': dot substituted for <bc>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a6>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <82>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <8e>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <87>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <af>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <86>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <ba>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a6>

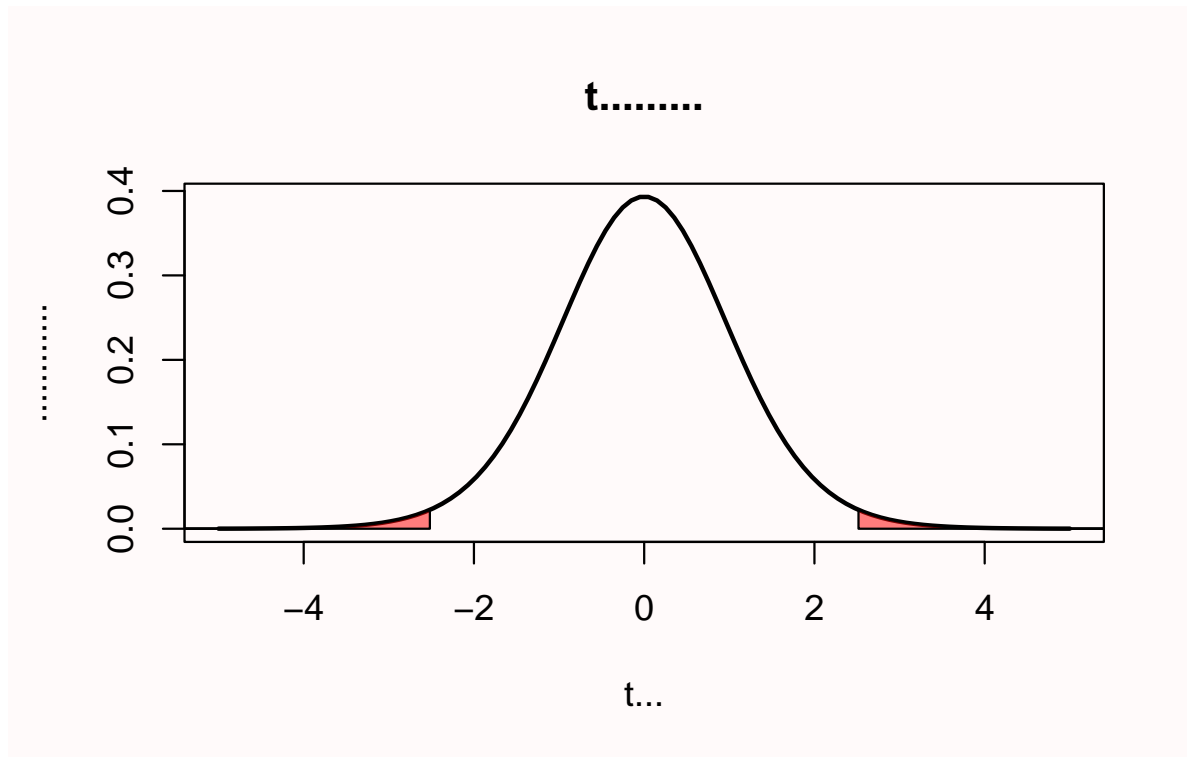


Figure 1.1: A  $t$ -distribution with 18 degrees of freedom.

## 1.4 p

“*p*” Geoff Cumming  $p$  “  $p$ ”  $p$   $p$

$p$   $p$   $p$   $p$

$p$  0~1  $t$  15 100 105 IQ

```
p <- numeric(100000) # store all simulated *p*-values
for (i in 1:100000) { # for each simulated experiment
```

```

x <- rnorm(n = 71, mean = 100, sd = 15) # Simulate data
y <- rnorm(n = 71, mean = 105, sd = 15) # Simulate data
p[i] <- t.test(x, y)$p.value # store the *p*-value
}

(sum(p < 0.05) / 100000) # compute power

hist(p, breaks = 20) # plot a histogram

```

IQ      n = 71   M=100 105   =15      t   p   p

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on '50% p ' in 'mbcsToSbcs': dot substituted for  
<e5>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on '50% p ' in 'mbcsToSbcs': dot substituted for  
<8a>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on '50% p ' in 'mbcsToSbcs': dot substituted for  
<9f>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on '50% p ' in 'mbcsToSbcs': dot substituted for  
<e6>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on '50% p ' in 'mbcsToSbcs': dot substituted for  
<95>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on '50% p ' in 'mbcsToSbcs': dot substituted for  
<88>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on '50% p ' in 'mbcsToSbcs': dot substituted for  
<e4>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on '50% p ' in 'mbsToSbcs': dot substituted for  
<b8>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on '50% p ' in 'mbsToSbcs': dot substituted for  
<8b>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on '50% p ' in 'mbsToSbcs': dot substituted for  
<e7>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on '50% p ' in 'mbsToSbcs': dot substituted for  
<9a>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on '50% p ' in 'mbsToSbcs': dot substituted for  
<84>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on '50% p ' in 'mbsToSbcs': dot substituted for  
<e5>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on '50% p ' in 'mbsToSbcs': dot substituted for  
<80>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on '50% p ' in 'mbsToSbcs': dot substituted for  
<bc>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on '50% p ' in 'mbsToSbcs': dot substituted for  
<e5>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on '50% p ' in 'mbsToSbcs': dot substituted for  
<88>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on '50% p ' in 'mbcsToSbcs': dot substituted for  
<86>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on '50% p ' in 'mbcsToSbcs': dot substituted for  
<e5>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on '50% p ' in 'mbcsToSbcs': dot substituted for  
<b8>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on '50% p ' in 'mbcsToSbcs': dot substituted for  
<83>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on 'P ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on 'P ' in 'mbcsToSbcs': dot substituted for <80>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on 'P ' in 'mbcsToSbcs': dot substituted for <bc>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on 'p ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on 'p ' in 'mbcsToSbcs': dot substituted for <80>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on 'p ' in 'mbcsToSbcs': dot substituted for <bc>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on 'p ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on 'p ' in 'mbcsToSbcs': dot substituted for <9a>



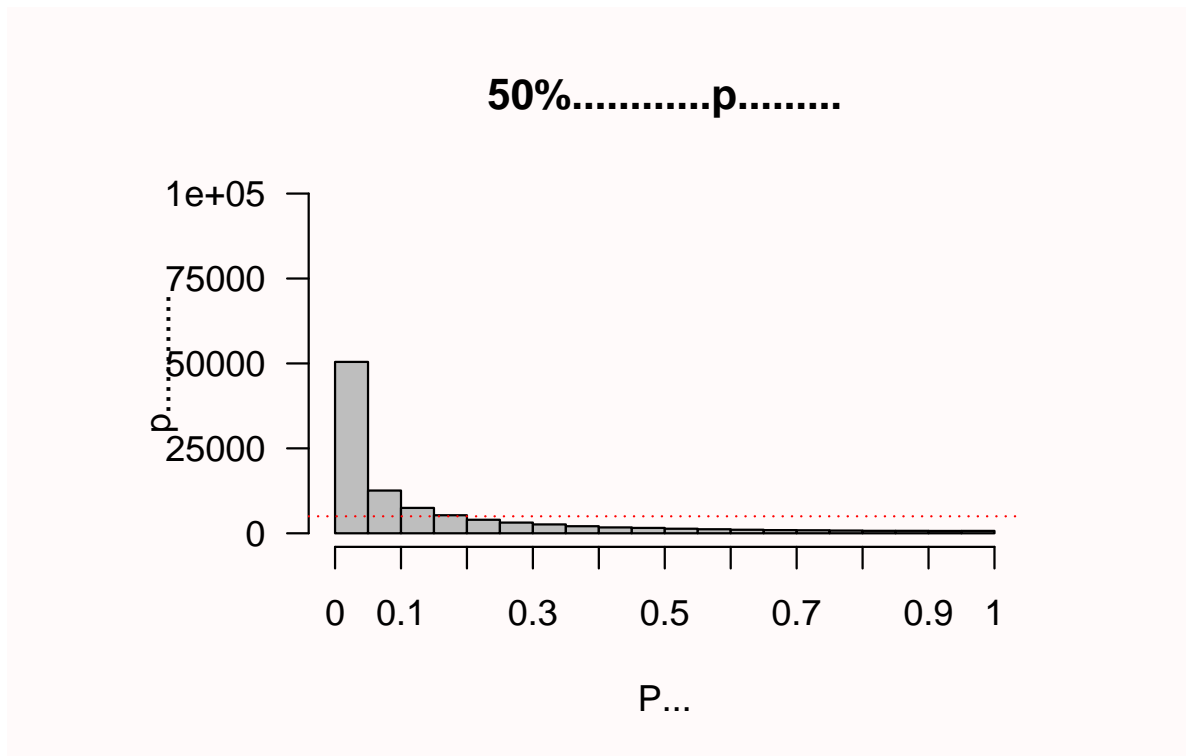


Figure 1.2: Distribution of  $p$ -values when power = 50%.



Warning in title(...): conversion failure on 'p ' in 'mbcsToSbcs': dot substituted for <88>

Warning in title(...): conversion failure on 'p ' in 'mbcsToSbcs': dot substituted for <86>

Warning in title(...): conversion failure on 'p ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in title(...): conversion failure on 'p ' in 'mbcsToSbcs': dot substituted for <b8>

Warning in title(...): conversion failure on 'p ' in 'mbcsToSbcs': dot substituted for <83>

Warning in title(...): conversion failure on 'p ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in title(...): conversion failure on 'p ' in 'mbcsToSbcs': dot substituted for <80>

Warning in title(...): conversion failure on 'p ' in 'mbcsToSbcs': dot substituted for <bc>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a6>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <82>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <8e>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <87>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <af>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <86>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <ba>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a6>

$p$   $p$  0.08  $p$  0.98  $p$   $p$   $p$   $\alpha$   $p$

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...): conversion failure on ' p ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...): conversion failure on ' p ' in 'mbcsToSbcs': dot substituted for <bd>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...): conversion failure on ' p ' in 'mbcsToSbcs': dot substituted for <93>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...): conversion failure on ' p ' in 'mbcsToSbcs': dot substituted for <e9>

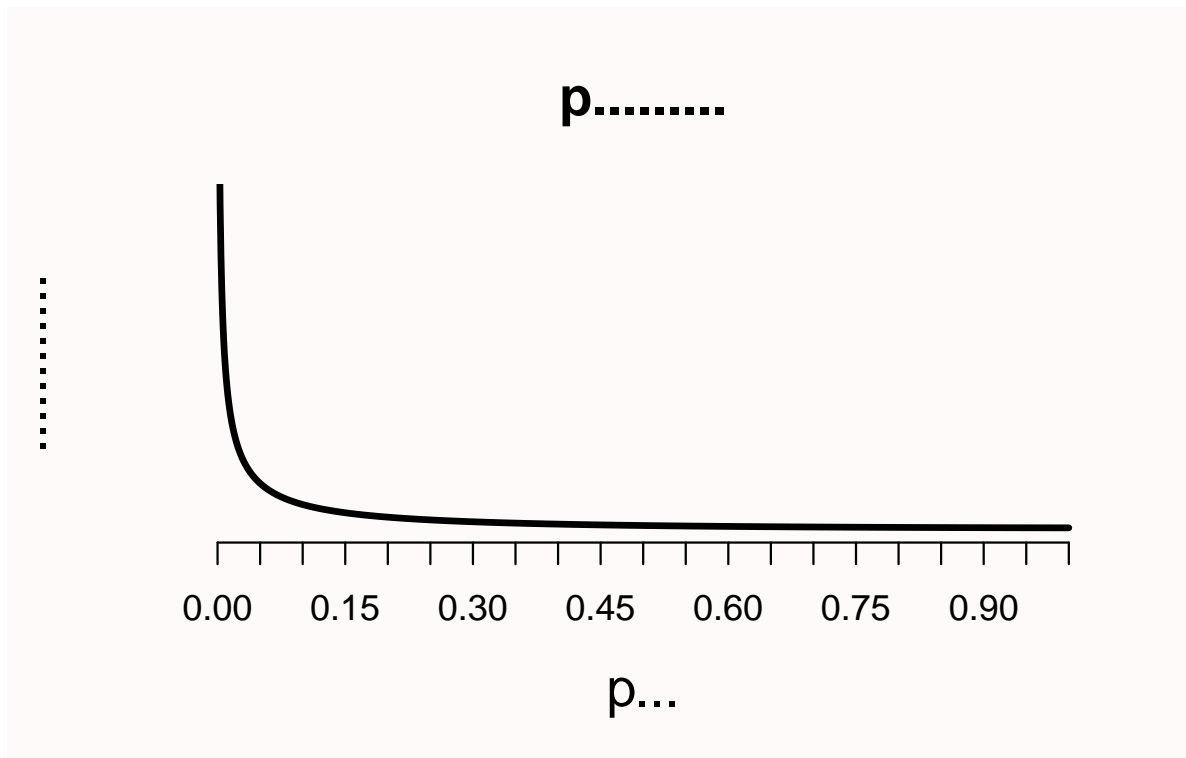


Figure 1.3: Probability density function for  $p$ -values from a two-sided  $t$ -test.

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on ' p ' in 'mbscsToSbcs': dot  
substituted for <9b>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on ' p ' in 'mbscsToSbcs': dot  
substituted for <b6>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on ' p ' in 'mbscsToSbcs': dot  
substituted for <e5>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on ' p ' in 'mbscsToSbcs': dot  
substituted for <81>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on ' p ' in 'mbscsToSbcs': dot  
substituted for <87>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on ' p ' in 'mbscsToSbcs': dot  
substituted for <e8>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on ' p ' in 'mbscsToSbcs': dot  
substituted for <ae>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on ' p ' in 'mbscsToSbcs': dot  
substituted for <be>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on ' p ' in 'mbscsToSbcs': dot  
substituted for <e4>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on ' p ' in 'mbscsToSbcs': dot  
substituted for <b8>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on ' p ' in 'mbscsToSbcs': dot  
substituted for <ba>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on ' p ' in 'mbscsToSbcs': dot  
substituted for <e7>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on ' p ' in 'mbscsToSbcs': dot  
substituted for <9c>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on ' p ' in 'mbscsToSbcs': dot  
substituted for <9f>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on ' p ' in 'mbscsToSbcs': dot  
substituted for <e6>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on ' p ' in 'mbscsToSbcs': dot  
substituted for <97>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on ' p ' in 'mbscsToSbcs': dot  
substituted for <b6>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on ' p ' in 'mbscsToSbcs': dot  
substituted for <e7>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on ' p ' in 'mbscsToSbcs': dot  
substituted for <9a>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on ' p ' in 'mbscsToSbcs': dot  
substituted for <84>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on ' p ' in 'mbcsToSbcs': dot  
substituted for <e5>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on ' p ' in 'mbcsToSbcs': dot  
substituted for <80>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on ' p ' in 'mbcsToSbcs': dot  
substituted for <bc>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on ' p ' in 'mbcsToSbcs': dot  
substituted for <e5>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on ' p ' in 'mbcsToSbcs': dot  
substituted for <88>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on ' p ' in 'mbcsToSbcs': dot  
substituted for <86>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on ' p ' in 'mbcsToSbcs': dot  
substituted for <e5>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on ' p ' in 'mbcsToSbcs': dot  
substituted for <b8>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on ' p ' in 'mbcsToSbcs': dot  
substituted for <83>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on 'p' in 'mbcsToSbcs': dot substituted for <e5>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on 'p ' in 'mbcsToSbcs': dot substituted for <80>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on 'p ' in 'mbcsToSbcs': dot substituted for <bc>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on 'p ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on 'p ' in 'mbcsToSbcs': dot substituted for <80>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on 'p ' in 'mbcsToSbcs': dot substituted for <bc>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on 'p ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on 'p ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on 'p ' in 'mbcsToSbcs': dot substituted for <84>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on 'p ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on 'p ' in 'mbcsToSbcs': dot substituted for <95>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on 'p ' in 'mbcsToSbcs': dot substituted for <b0>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on 'p ' in 'mbcsToSbcs': dot substituted for <e9>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on 'p ' in 'mbcsToSbcs': dot substituted for <87>

Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
conversion failure on 'p ' in 'mbcsToSbcs': dot substituted for <8f>

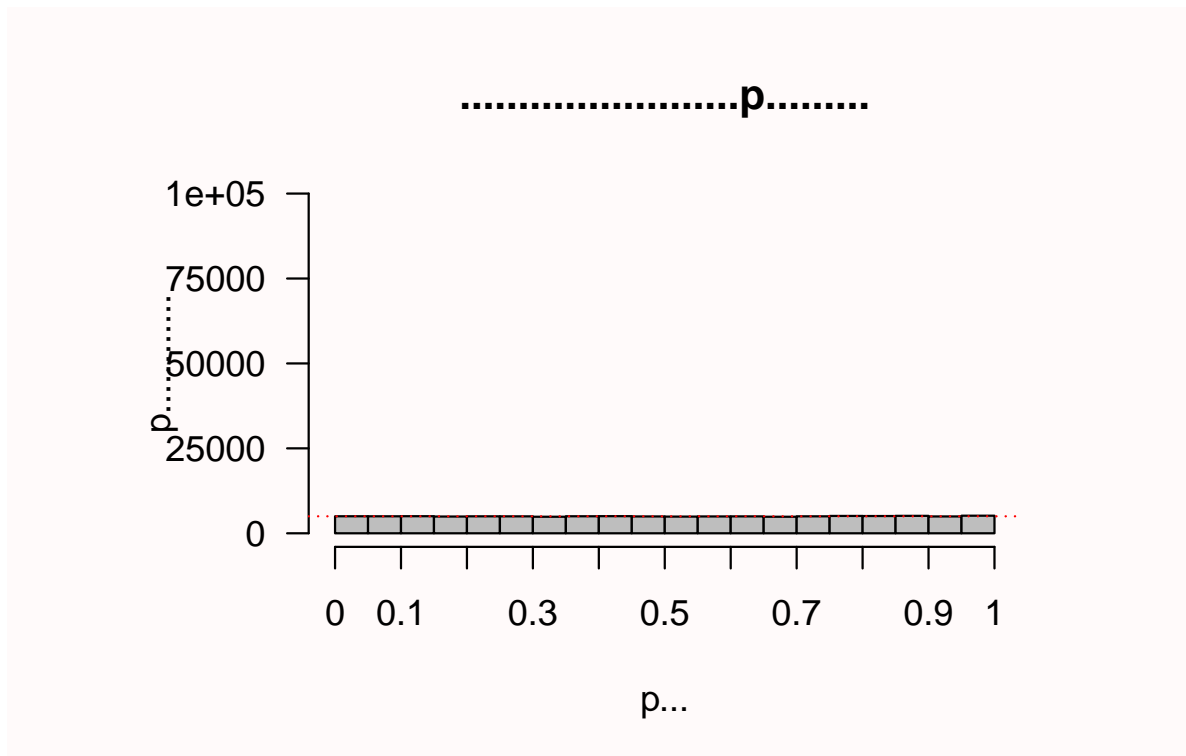


Figure 1.4: Distribution of  $p$ -values when the null hypothesis is true.



## 1.5

0.05  $p$   $p=0.04$  (Lindley, 1957) - (Spanos, 2013)  $p$   
 (Cumming, 2008)  $p$   $p$   $p$  1%  $p$  0.04 0.05  $p$  0.05 0.01 @ref(fig:paradox)  
 $p$  0.04  $H_0$  @ref(fig:paradox)  $p$  0.04  $p$  99% 0.04  $p$   
 Pearson 5%  
 (1992) “ ”  $p$

Warning in title(...): conversion failure on 'd = 0,  
 50% 99%  $p$  ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in title(...): conversion failure on 'd = 0,  
 50% 99%  $p$  ' in 'mbcsToSbcs': dot substituted for <92>

Warning in title(...): conversion failure on 'd = 0,  
 50% 99%  $p$  ' in 'mbcsToSbcs': dot substituted for <8c>

Warning in title(...): conversion failure on 'd = 0,  
 50% 99%  $p$  ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in title(...): conversion failure on 'd = 0,  
 50% 99%  $p$  ' in 'mbcsToSbcs': dot substituted for <bb>

Warning in title(...): conversion failure on 'd = 0,  
 50% 99%  $p$  ' in 'mbcsToSbcs': dot substituted for <9f>

Warning in title(...): conversion failure on 'd = 0,  
 50% 99%  $p$  ' in 'mbcsToSbcs': dot substituted for <e8>

Warning in title(...): conversion failure on 'd = 0,  
 50% 99%  $p$  ' in 'mbcsToSbcs': dot substituted for <ae>

Warning in title(...): conversion failure on 'd = 0,  
 50% 99%  $p$  ' in 'mbcsToSbcs': dot substituted for <a1>

Warning in title(...): conversion failure on 'd = 0,  
 50% 99%  $p$  ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in title(...): conversion failure on 'd = 0,  
50% 99% p ' in 'mbcsToSbcs': dot substituted for <8a>

Warning in title(...): conversion failure on 'd = 0,  
50% 99% p ' in 'mbcsToSbcs': dot substituted for <9f>

Warning in title(...): conversion failure on 'd = 0,  
50% 99% p ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in title(...): conversion failure on 'd = 0,  
50% 99% p ' in 'mbcsToSbcs': dot substituted for <95>

Warning in title(...): conversion failure on 'd = 0,  
50% 99% p ' in 'mbcsToSbcs': dot substituted for <88>

Warning in title(...): conversion failure on 'd = 0,  
50% 99% p ' in 'mbcsToSbcs': dot substituted for <e4>

Warning in title(...): conversion failure on 'd = 0,  
50% 99% p ' in 'mbcsToSbcs': dot substituted for <b8>

Warning in title(...): conversion failure on 'd = 0,  
50% 99% p ' in 'mbcsToSbcs': dot substituted for <8b>

Warning in title(...): conversion failure on 'd = 0,  
50% 99% p ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in title(...): conversion failure on 'd = 0,  
50% 99% p ' in 'mbcsToSbcs': dot substituted for <9a>

Warning in title(...): conversion failure on 'd = 0,  
50% 99% p ' in 'mbcsToSbcs': dot substituted for <84>

Warning in title(...): conversion failure on 'd = 0,  
50% 99% p ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in title(...): conversion failure on 'd = 0,  
50% 99% p ' in 'mbcsToSbcs': dot substituted for <80>

Warning in title(...): conversion failure on 'd = 0,  
50% 99% p ' in 'mbcsToSbcs': dot substituted for <bc>

Warning in title(...): conversion failure on 'd = 0,  
50% 99% p ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in title(...): conversion failure on 'd = 0,  
50% 99% p ' in 'mbcsToSbcs': dot substituted for <88>

Warning in title(...): conversion failure on 'd = 0,  
50% 99% p ' in 'mbcsToSbcs': dot substituted for <86>

Warning in title(...): conversion failure on 'd = 0,  
50% 99% p ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in title(...): conversion failure on 'd = 0,  
50% 99% p ' in 'mbcsToSbcs': dot substituted for <b8>

Warning in title(...): conversion failure on 'd = 0,  
50% 99% p ' in 'mbcsToSbcs': dot substituted for <83>

Warning in title(...): conversion failure on 'p ' in 'mbcsToSbcs': dot  
substituted for <e5>

Warning in title(...): conversion failure on 'p ' in 'mbcsToSbcs': dot  
substituted for <80>

Warning in title(...): conversion failure on 'p ' in 'mbcsToSbcs': dot  
substituted for <bc>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot  
substituted for <e6>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot  
substituted for <a6>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot  
substituted for <82>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <8e>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <87>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <af>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <86>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <ba>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a6>

## 1.6 *p*

Neyman-Pearson	$p < \alpha$ $p > \alpha$	$p$	(Appelbaum et al., 2018)	$p$	$\alpha$
(Lehmann & Romano, 2005)		$p$	$\alpha$ 0.000001	Fisher	
(1935)	" "	0 1	"		
" " " " "					

$\alpha\%$   $\beta\%$

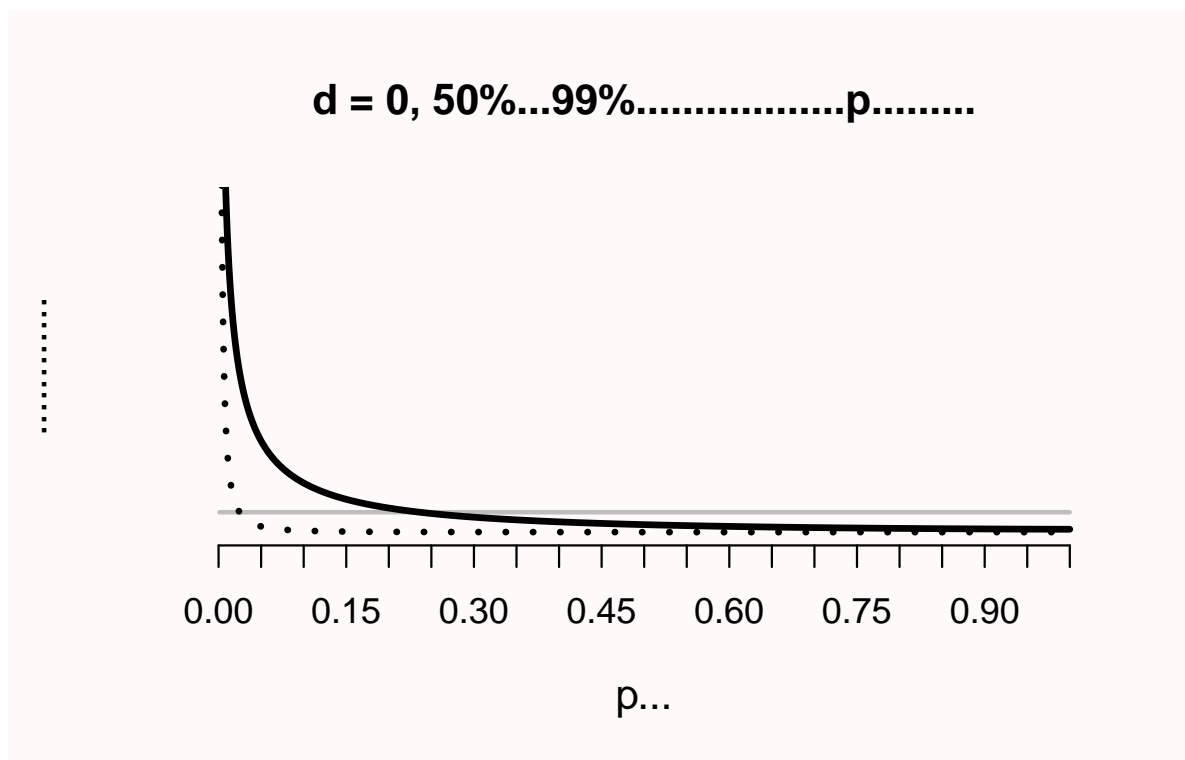


Figure 1.5:  $P$ -value distribution for 0 (grey horizontal line, 50 percent power (black solid curve), and 99 percent power (black dotted curve, where  $p$ -values just below 0.05 are more likely when  $H_0$  is true than when  $H_1$  is true).

Neyman-Pearson OPERA 2011 0.2

Neyman-Pearson " " " "

" "

(Niiniluoto, 1998; Popper, 2002) "p=.xx y% "p=.xx "  $\alpha$

Popper (2002) " " " " Hacking

(1965) " " Neyman (1957) "

p Bland (2015) p " "  $p > 0.1$  " "  $0.01 < p < 0.05$  " "  $p <$

0.001 " " p (Johansson, 2011; Lakens, 2022)

## 1.7 Preventing common misconceptions about $p$ -values

$p$   $p$   $p$  " "

0

2.00 0  $t$   $t$   $t$   $t$   $p$   $t$   $t$  1.96-

$t$  50 0 1 1  $d$  50  $t$   $d$  0

Warning in title(...): conversion failure on 'N = 50 ' in 'mbcsToSbcs':  
dot substituted for <e7>

Warning in title(...): conversion failure on 'N = 50 ' in 'mbcsToSbcs':  
dot substituted for <9a>

Warning in title(...): conversion failure on 'N = 50 ' in 'mbcsToSbcs':  
dot substituted for <84>

Warning in title(...): conversion failure on 'N = 50 ' in 'mbcsToSbcs':  
dot substituted for <e9>

Warning in title(...): conversion failure on 'N = 50 ' in 'mbcsToSbcs':  
dot substituted for <9b>

Warning in title(...): conversion failure on 'N = 50 ' in 'mbcsToSbcs':  
dot substituted for <b6>

Warning in title(...): conversion failure on 'N = 50 ' in 'mbcsToSbcs':  
dot substituted for <e5>

```
Warning in title(...): conversion failure on 'N = 50' in 'mbcsToSbcs':
dot substituted for <81>
```

```
Warning in title(...): conversion failure on 'N = 50' in 'mbcsToSbcs':
dot substituted for <87>
```

```
Warning in title(...): conversion failure on 'N = 50' in 'mbcsToSbcs':
dot substituted for <e8>
```

Warning in title(...): conversion failure on 'N = 50' in 'mbcsToSbcs':  
dot substituted for <ae>

Warning in title(...): conversion failure on 'N = 50' in 'mbcsToSbcs':  
dot substituted for <be>

```
Warning in title(...): conversion failure on ' ' in 'mbsToSbcs': dot
substituted for <e5>
```

```
Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot
substituted for <b7>
```

```
Warning in title(...): conversion failure on ' ' in 'mbscToSbcs': dot
substituted for <ae>
```

```
Warning in title(...): conversion failure on ' ' in 'mbsToSbcs': dot
substituted for <e5>
```

```
Warning in title(...): conversion failure on ' ' in 'mbscsToSbcs': dot
substituted for <bc>
```

```
Warning in title(...): conversion failure on ' ' in 'mbscToSbcs': dot
substituted for <82>
```

0 X 0 0 0

Y 0 0 2.5% 2.5% 0 50 5%

0.5 0 0 0.5 p 5% 0

t 5000 50 0 — 0

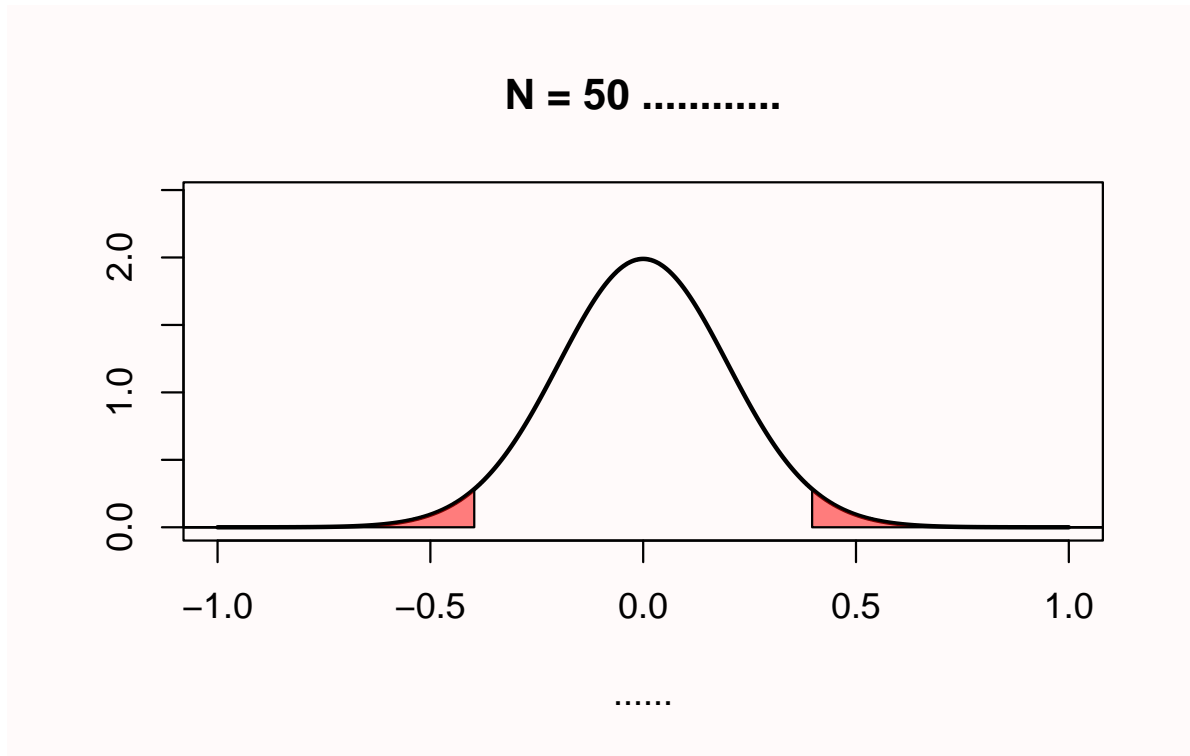


Figure 1.6: 50 t Cohen's  $d$



Warning in title(...): conversion failure on 'N = 5000 ' in  
'mbcsToSbcs': dot substituted for <e7>

Warning in title(...): conversion failure on 'N = 5000 ' in  
'mbcsToSbcs': dot substituted for <9a>

Warning in title(...): conversion failure on 'N = 5000 ' in  
'mbcsToSbcs': dot substituted for <84>

Warning in title(...): conversion failure on 'N = 5000 ' in  
'mbcsToSbcs': dot substituted for <e9>

Warning in title(...): conversion failure on 'N = 5000 ' in  
'mbcsToSbcs': dot substituted for <9b>

Warning in title(...): conversion failure on 'N = 5000 ' in  
'mbcsToSbcs': dot substituted for <b6>

Warning in title(...): conversion failure on 'N = 5000 ' in  
'mbcsToSbcs': dot substituted for <e5>

Warning in title(...): conversion failure on 'N = 5000 ' in  
'mbcsToSbcs': dot substituted for <81>

Warning in title(...): conversion failure on 'N = 5000 ' in  
'mbcsToSbcs': dot substituted for <87>

Warning in title(...): conversion failure on 'N = 5000 ' in  
'mbcsToSbcs': dot substituted for <e8>

Warning in title(...): conversion failure on 'N = 5000 ' in  
'mbcsToSbcs': dot substituted for <ae>

Warning in title(...): conversion failure on 'N = 5000 ' in  
'mbcsToSbcs': dot substituted for <be>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot  
substituted for <e5>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <ae>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <bc>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <82>

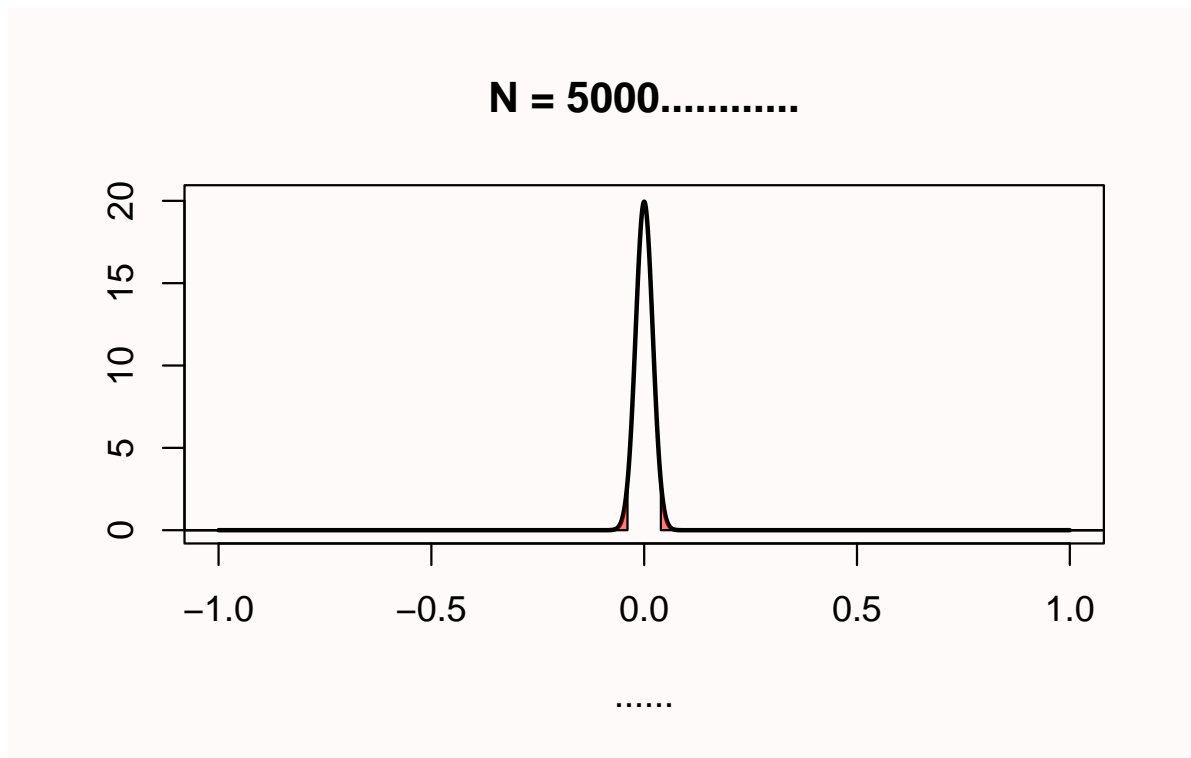


Figure 1.7:  $d=0$  5000 t Cohen's  $d$

5000 :

$$\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}$$

n =50 :

$$\sqrt{\frac{1^2}{50} + \frac{1^2}{50}}$$

n = 50      0.2   n = 5000      0.02      95%      1.96      50      -1.96 \* 0.2 =  
-0.392 +1.96 \* 0.2 = 0.392      n = 50      -0.392 0.392      5000      -1.96 \* 0.02 +1.96 \*  
0.02      -0.0392 0.0392      n = 5000      n=50      0.  
n = 5000      0.5      50      0.5      p      0  
G\*power,    @ref(fig:gpowerscreenshot)) :

(ref:gpowerscreenshotlab) G\*Power t 1.66055

(ref:gpowerscreenshotlab) Screenshot from G\*Power software visualizing the null model (red distribution) and alternative model (blue distribution) and the critical *t*-value (1.66055) that is the threshold distinguishing significant and non-significant results.

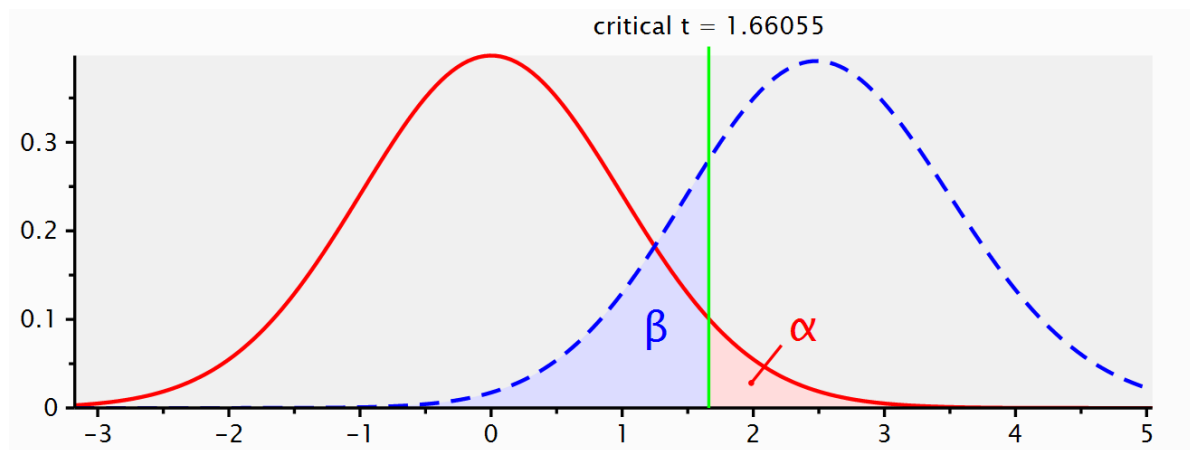


Figure 1.8: G\*Power t 1.66055

?      Paul Meehl      ”      ”      50      “      ”      0.5      0

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <e7>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <9a>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <84>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <e9>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <9b>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <b6>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <e5>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <81>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <87>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <e8>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <ae>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <be>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <e5>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <92>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <8c>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <e5>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <a4>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <87>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <e6>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <8b>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <a9>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <e5>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <81>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <87>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <e8>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <ae>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <be>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot  
substituted for <e5>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <ae>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <bc>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <82>

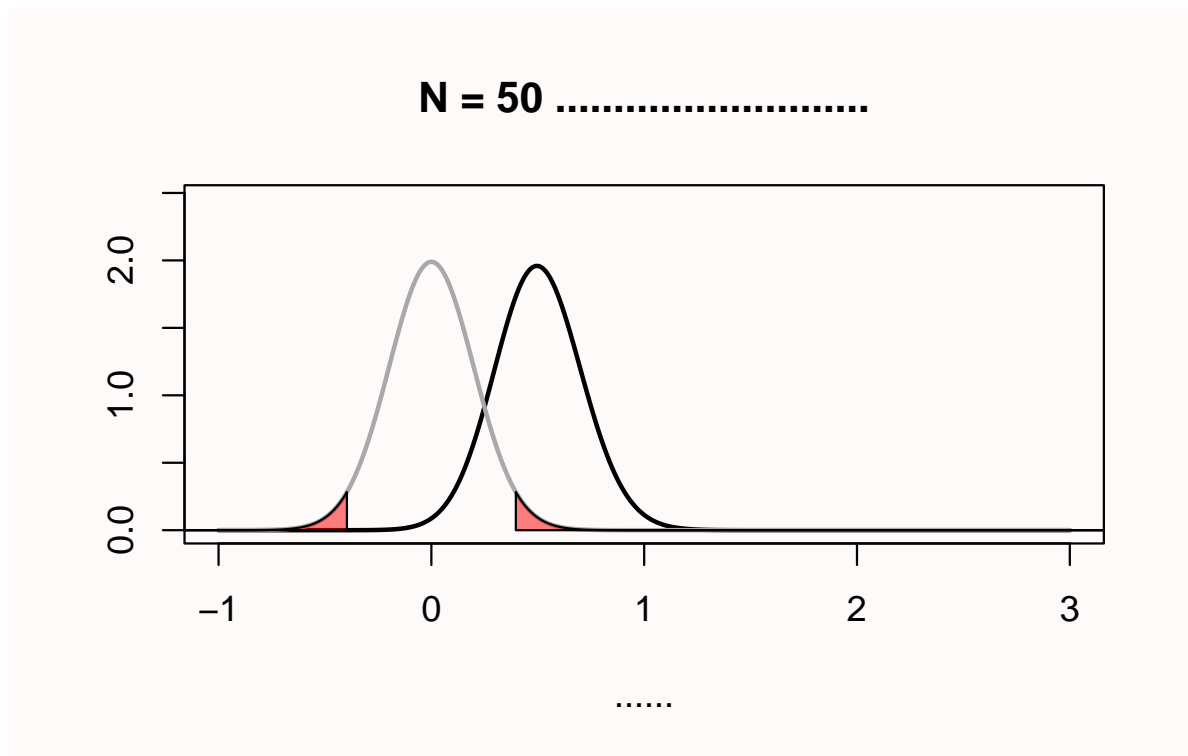


Figure 1.9:  $d = 0$  50  $t$  Cohen's  $d$

” ”

1.5



Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <81>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <87>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <e8>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <ae>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <be>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <e5>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <92>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <8c>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <e5>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <a4>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <87>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <e6>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <8b>



Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <a9>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <e5>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <81>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <87>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <e8>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <ae>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <be>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot  
substituted for <e5>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot  
substituted for <b7>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot  
substituted for <ae>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot  
substituted for <e5>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot  
substituted for <bc>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot  
substituted for <82>

Warning in text.default(0.35, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in text.default(0.35, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <89>

Warning in text.default(0.35, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <80>

Warning in text.default(0.35, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in text.default(0.35, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <be>

Warning in text.default(0.35, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <97>

Warning in text.default(0.35, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in text.default(0.35, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <9d>

Warning in text.default(0.35, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <87>

Warning in text.default(0.35, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in text.default(0.35, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <80>

Warning in text.default(0.35, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <bc>

Warning in text.default(0.35, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in text.default(0.35, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>

Warning in text.default(0.35, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <ae>

Warning in text.default(0.35, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in text.default(0.35, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <bc>

Warning in text.default(0.35, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <82>

Warning in text.default(0.35, 2.4, paste(" "), cex = 1): font metrics unknown for Unicode character U+6240

Warning in text.default(0.35, 2.4, paste(" "), cex = 1): font metrics unknown for Unicode character U+5f97

Warning in text.default(0.35, 2.4, paste(" "), cex = 1): font metrics unknown for Unicode character U+5747

Warning in text.default(0.35, 2.4, paste(" "), cex = 1): font metrics unknown for Unicode character U+503c

Warning in text.default(0.35, 2.4, paste(" "), cex = 1): font metrics unknown for Unicode character U+5dee

Warning in text.default(0.35, 2.4, paste(" "), cex = 1): font metrics unknown for Unicode character U+5f02

p 0.35

“  $p > 0.05$  ”  $p$  p

p > .05 5%

, ,  $p > 0.05$   $p$  , ,

, ( Harms & Lakens (2018), ).

, , , ,  $p$  , , , , 0' ,  $p$

< .05' , 50 0.05 0.4 0.35 , —

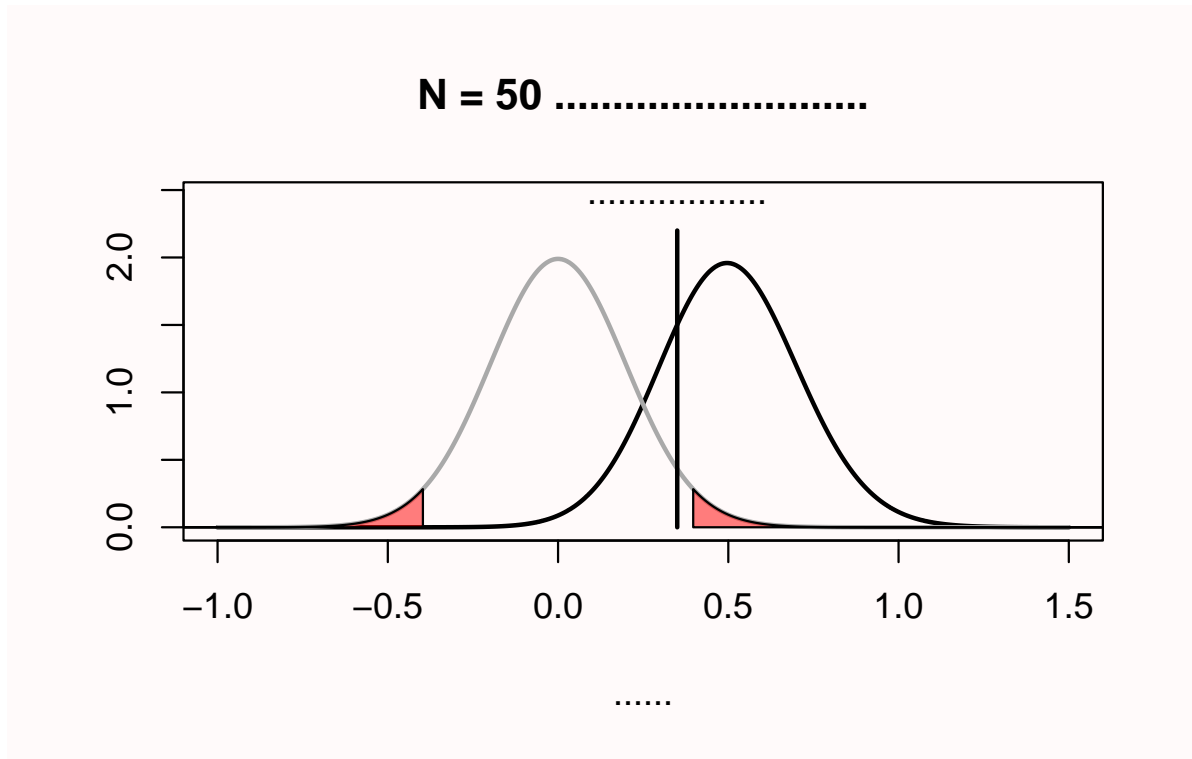


Figure 1.10:  $d = 0.35$   $d = 0$   $d = 0.5$  50 t Cohen's  $d$

## 1.7.2 2 p

'p < .05' ' ' p < .05' 100%

R

```
rnorm(n = 50, mean = 0, sd = 1)
```

```
[1] 0.4719836 1.1920227 1.7721923 2.1265877 -0.4252310 -0.6015820
[7] -0.7724946 2.1346629 -1.0146817 -1.9681660 0.4141101 -0.7775625
[13] -0.8676887 -2.9356859 -0.7683710 0.2427153 -1.6955546 -1.0225851
[19] 0.8434979 0.9441817 -1.1777169 0.5389057 1.3519592 0.1506133
[25] 0.5847717 1.3628052 0.2540480 -0.3172475 0.6699546 -0.5790094
[31] 0.2308175 -0.5749606 1.1622497 0.9164392 -0.7536052 0.0411087
[37] 0.4761396 1.5822320 -0.7285862 0.2672048 1.1460240 -0.4623852
[43] -0.3431018 1.2740455 -0.2109466 0.4215509 -0.9884471 1.5876178
[49] 0.1934516 1.1746930
```

0 1 50 — 0.5 0 t p <  
.05 0 R 0

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <e7>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <9a>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <84>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <e9>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <9b>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <b6>

Warning in title(...): conversion failure on 'N = 50' in  
'mbsToSbcs': dot substituted for <e5>

Warning in title(...): conversion failure on 'N = 50' in  
'mbsToSbcs': dot substituted for <81>

Warning in title(...): conversion failure on 'N = 50' in  
'mbsToSbcs': dot substituted for <87>

Warning in title(...): conversion failure on 'N = 50' in  
'mbsToSbcs': dot substituted for <e8>

Warning in title(...): conversion failure on 'N = 50' in  
'mbsToSbcs': dot substituted for <ae>

Warning in title(...): conversion failure on 'N = 50' in  
'mbsToSbcs': dot substituted for <be>

Warning in title(...): conversion failure on 'N = 50' in  
'mbsToSbcs': dot substituted for <e5>

Warning in title(...): conversion failure on 'N = 50' in  
'mbsToSbcs': dot substituted for <92>

Warning in title(...): conversion failure on 'N = 50' in  
'mbsToSbcs': dot substituted for <8c>

Warning in title(...): conversion failure on 'N = 50' in  
'mbsToSbcs': dot substituted for <e5>

Warning in title(...): conversion failure on 'N = 50' in  
'mbsToSbcs': dot substituted for <a4>

Warning in title(...): conversion failure on 'N = 50' in  
'mbsToSbcs': dot substituted for <87>

Warning in title(...): conversion failure on 'N = 50' in  
'mbsToSbcs': dot substituted for <e6>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <8b>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <a9>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <e5>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <81>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <87>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <e8>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <ae>

Warning in title(...): conversion failure on 'N = 50' in  
'mbcsToSbcs': dot substituted for <be>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot  
substituted for <e5>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot  
substituted for <b7>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot  
substituted for <ae>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot  
substituted for <e5>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot  
substituted for <bc>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <82>

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <89>

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <80>

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <be>

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <97>

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <9d>

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <87>

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <80>

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <bc>



Warning in text.default(0.5, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <ae>

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <bc>

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <82>

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): font metrics unknown for Unicode character U+6240

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): font metrics unknown for Unicode character U+5f97

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): font metrics unknown for Unicode character U+5747

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): font metrics unknown for Unicode character U+503c

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): font metrics unknown for Unicode character U+5dee

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): font metrics unknown for Unicode character U+5f02

p “ ” 50 p — —  
—  
< ’  $p < .05$  ’  $p$  ” ” - “ 5% ”  
“ ” ” ” ” 5% ” 5% ”  
R

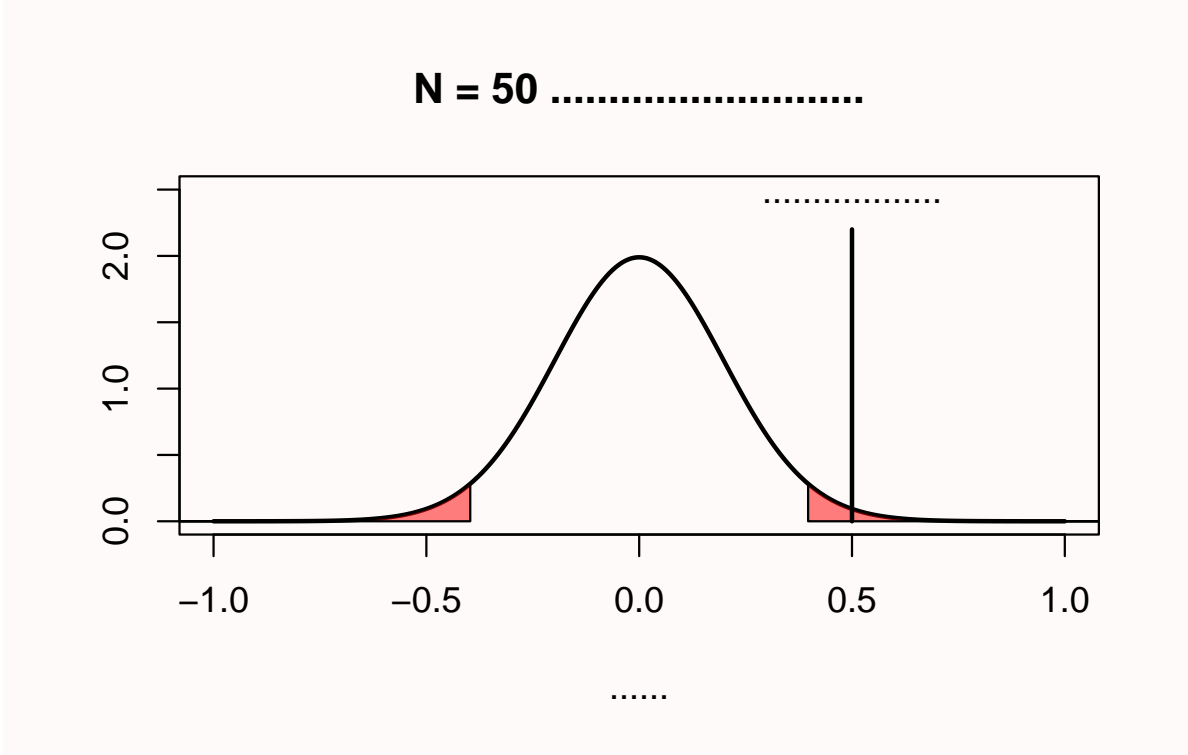


Figure 1.11:  $d=0$   $d=0.5$  50  $t$  Cohen's  $d$

### 1.7.3 3 $p$

$p$  “ ” ” ” ” ” ” ”  
 $p$  0  
 $n=10000$  0.04 ” ” 0.04 5% 95% 0.04  
0.04 (Anvari et al., 2021).  $p$   
 $p$   $p < 0.05$  ” ” “ ” ” ” ” ”

### 1.7.4 4 5%

$p$  ” ” 20 R

Warning in title(...): conversion failure on 'N = 20' in  
'mbcsToSbcs': dot substituted for <e7>

Warning in title(...): conversion failure on 'N = 20' in  
'mbcsToSbcs': dot substituted for <9a>

Warning in title(...): conversion failure on 'N = 20' in  
'mbcsToSbcs': dot substituted for <84>

Warning in title(...): conversion failure on 'N = 20' in  
'mbcsToSbcs': dot substituted for <e9>

Warning in title(...): conversion failure on 'N = 20' in  
'mbcsToSbcs': dot substituted for <9b>

Warning in title(...): conversion failure on 'N = 20' in  
'mbcsToSbcs': dot substituted for <b6>

Warning in title(...): conversion failure on 'N = 20' in  
'mbcsToSbcs': dot substituted for <e5>

Warning in title(...): conversion failure on 'N = 20' in  
'mbcsToSbcs': dot substituted for <81>

Warning in title(...): conversion failure on 'N = 20' in  
'mbcsToSbcs': dot substituted for <87>

Warning in title(...): conversion failure on 'N = 20' in  
'mbcsToSbcs': dot substituted for <e8>

Warning in title(...): conversion failure on 'N = 20' in  
'mbcsToSbcs': dot substituted for <ae>

Warning in title(...): conversion failure on 'N = 20' in  
'mbcsToSbcs': dot substituted for <be>

Warning in title(...): conversion failure on 'N = 20' in  
'mbcsToSbcs': dot substituted for <e5>

Warning in title(...): conversion failure on 'N = 20' in  
'mbcsToSbcs': dot substituted for <92>

Warning in title(...): conversion failure on 'N = 20' in  
'mbcsToSbcs': dot substituted for <8c>

Warning in title(...): conversion failure on 'N = 20' in  
'mbcsToSbcs': dot substituted for <e5>

Warning in title(...): conversion failure on 'N = 20' in  
'mbcsToSbcs': dot substituted for <a4>

Warning in title(...): conversion failure on 'N = 20' in  
'mbcsToSbcs': dot substituted for <87>

Warning in title(...): conversion failure on 'N = 20' in  
'mbcsToSbcs': dot substituted for <e6>

Warning in title(...): conversion failure on 'N = 20' in  
'mbcsToSbcs': dot substituted for <8b>

Warning in title(...): conversion failure on 'N = 20' in  
'mbcsToSbcs': dot substituted for <a9>

Warning in title(...): conversion failure on 'N = 20' in  
'mbcsToSbcs': dot substituted for <e5>

Warning in title(...): conversion failure on 'N = 20' in  
'mbcsToSbcs': dot substituted for <81>

Warning in title(...): conversion failure on 'N = 20' in  
'mbcsToSbcs': dot substituted for <87>

Warning in title(...): conversion failure on 'N = 20' in  
'mbcsToSbcs': dot substituted for <e8>

Warning in title(...): conversion failure on 'N = 20' in  
'mbcsToSbcs': dot substituted for <ae>

Warning in title(...): conversion failure on 'N = 20' in  
'mbcsToSbcs': dot substituted for <be>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot  
substituted for <e5>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot  
substituted for <b7>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot  
substituted for <ae>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot  
substituted for <e5>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot  
substituted for <bc>

Warning in title(...): conversion failure on ' ' in 'mbcsToSbcs': dot  
substituted for <82>

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): conversion  
failure on ' ' in 'mbcsToSbcs': dot substituted for <e6>

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <89>

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <80>

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <be>

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <97>

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <9d>

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <87>

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <80>

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <bc>

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <ae>

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <bc>

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <82>

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): font metrics unknown for Unicode character U+6240

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): font metrics unknown for Unicode character U+5f97

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): font metrics unknown for Unicode character U+5747

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): font metrics unknown for Unicode character U+503c

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): font metrics unknown for Unicode character U+5dee

Warning in text.default(0.5, 2.4, paste(" "), cex = 1): font metrics unknown for Unicode character U+5f02

100%

100%

5%

$p <$

“

### 1.7.5 5 1 $p$

(Miller, 2009)

$p=0.03$

97%

0.5

$p$

80%

80%

0

80

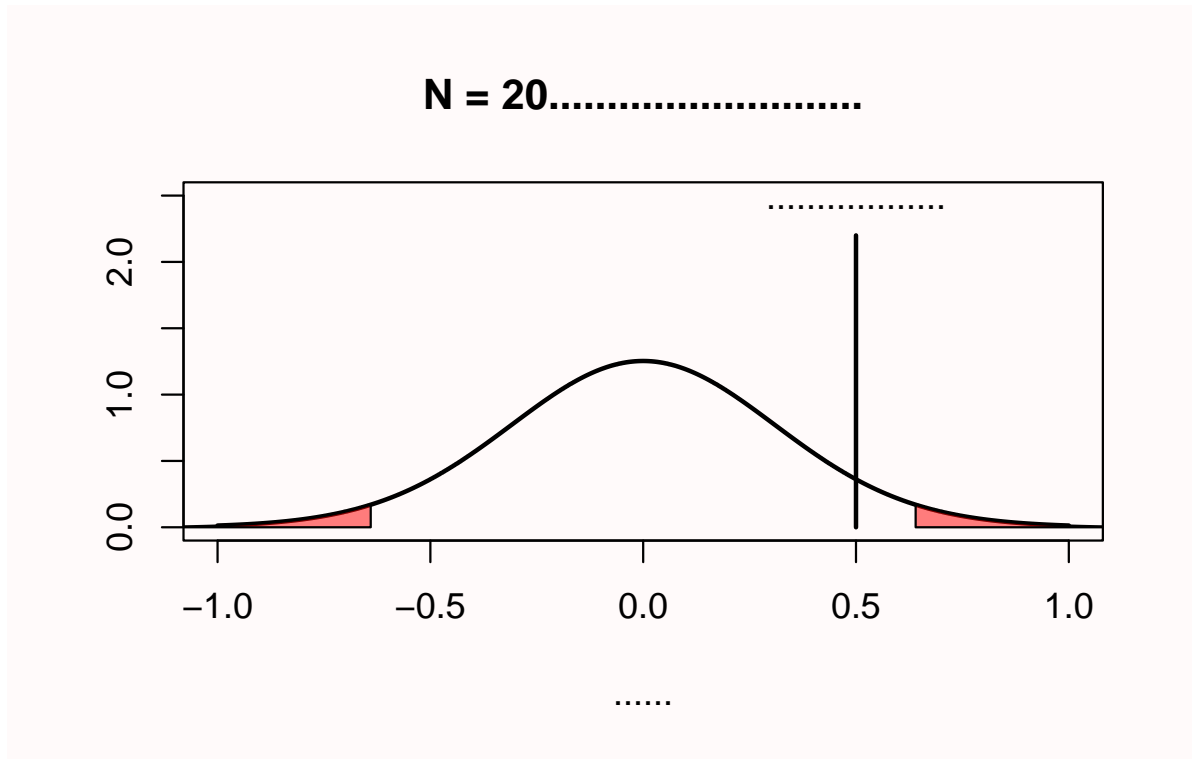


Figure 1.12:  $d=0$  20  $t$  Cohen's  $d$



## 1.8

### p

R

“ ”

R

```
nsims <- 100000 # number of simulations
#

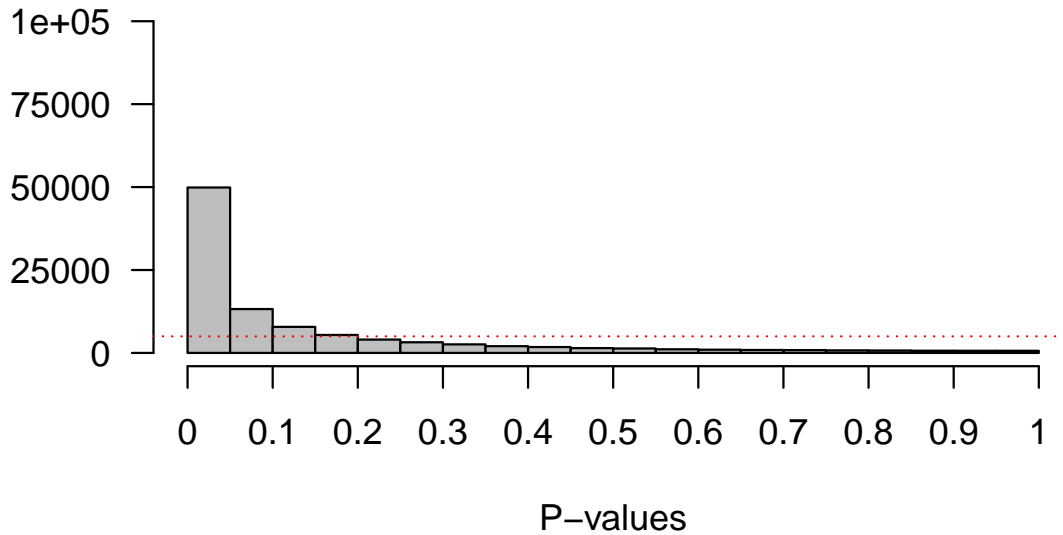
m <- 106 # mean sample
#
n <- 26 # set sample size
#
sd <- 15 # SD of the simulated data
#

p <- numeric(nsims) # set up empty vector
#
bars <- 20

for (i in 1:nsims) { # for each simulated experiment
  #
  x <- rnorm(n = n, mean = m, sd = sd)
  z <- t.test(x, mu = 100) # perform the t-test # T
  p[i] <- z$p.value # get the p-value # p
}
power <- round((sum(p < 0.05) / nsims), 2) # power #

# Plot figure #
hist(p,
  breaks = bars, xlab = "P-values", ylab = "number of p-values\n",
  axes = FALSE, main = paste("P-value Distribution with",
    round(power * 100, digits = 1), "% Power"),
  col = "grey", xlim = c(0, 1), ylim = c(0, nsims))
axis(side = 1, at = seq(0, 1, 0.1), labels = seq(0, 1, 0.1))
axis(side = 2, at = seq(0, nsims, nsims / 4),
  labels = seq(0, nsims, nsims / 4), las = 2)
abline(h = nsims / bars, col = "red", lty = 3)
```

## P-value Distribution with 50 % Power



1. x = 0, 1; y = p; alpha = 0.05 (5%); 100,000 \* 0.05 = 5000
2. A. 0.5; B. 0.00; C. 0.5; D. 0.05
3. A. p = 50%; B. p = 50%; C. p = 50%; D. p = 50%
4. IQ = 106; m = 100; t = 8; bars = 20; bars = 100; 0.01; 0.02; 1; 100; xlim = c(0, 100)
5. Q4; p; A. I; B. II; C. I; D. II

1) xlim = c(0, 0.05) 0 1 p 0 0.05 p m <- 100 1%

p p y

9 m <- 107 n 51 p 0.00 0.01 p

90.5% 5% alpha 1% alpha 1% alpha

15 p < 0.05 p < 0.01 alpha 0.01 0.05

A. ~90% B. ~75% C. ~50% D. ~5%

0.03 0.04 p y ylim = c(0, nSims) ylim = c(0, 10000)

108 m <- 108) 51

0.04 0.05 p 0.04 0.05 96%

p 0.04 0.05 — 1% p 0.01 0.04 0.05 p 1%

p alpha 0.05 p 0.04 0.05 p

0.05 alpha p = .045 p p

\* 7 98% p 0.045

A. B. C. 0.05 alpha D.

8 (n) (m) 0.04 0.05 p 1% p 0.04

0.05 p p p 0.04 0.05 p 5% p

0.04 0.05 1% p- 0.04 0.05

A. 0.04 0.05 p B. p 0.04 0.05 4 C. p 0.04 0.05

10 D. p 0.04 0.05 30

0.05 p 0.04 0.05 p Neyman-

Pearson 5% Type 1

### 1.8.1 p

1 t 50 @ref(fig:fig131) A. 0 B. 0 C. +0.5 -

0.5 D. +0.1 -0.1

2 @ref(fig:fig131) @ref(fig:fig132) A. t 1.96 2

“ ” 0 B. t 0 t n=50 0.4 n=5000 0.05 C. 0 n=5000 n=50

D. n=50 n=5000 n=50

3 app http://shiny.ieis.tue.nl/d\_p\_power/ t 2 0 2

n=50 0.4 “ 0.4 ” -0.4 app t

0.05 app II 1 80% 80%  
alpha  
app 3 app I II  
app 50 0.05 2 5000 app " " 1 n = 2 0 n  
= 1 app  
A. 1 1 95% -0.4 0.4 B. 1 n=50 95% -  
0.4 0.4 C. n=50 -0.4 0.4 D.  
4 alpha 0.01 0.5 50 alpha = 0.05  
A. 0.05 0.01 0.53 -0.53 B. 0.05 0.01 0.33 -  
0.33 C. 0.05 0.01 0.53 -0.53 D. 0.05 0.01 0  
0.33  
5 p (p > )  
A. p B. I C. D. II  
Q6: p p <  
A. p B. I C. D. II  
Q7: p " " " " " "  
" "  
app [http://shiny.ieis.tue.nl/d\\_p\\_power/](http://shiny.ieis.tue.nl/d_p_power/) 50000 0.5 0.05, 0  
A. -0.01 0.01 B. -0.04 0.04 C. -0.05 0.05 D. -0.12 0.12  
n=10000 0.04 " " 5% 0.04 95% 0.04  
0.04 p  
Q8: R rnorm(n = 50, mean = 0, sd = 1) 50 0.5 0 t p 0.03 0.05 p<  
A) 3%  
B) 5%  
C) 95%  
D) 100%  
Q9:  
A. 1-p B. 1-p C. D.  
Tversky (1971) " "  
20 z=2.23 p<0.05 10

“Suppose you have run an experiment on 20 subjects, and have obtained a significant result which confirms your theory ( $z = 2.23$ ,  $p < .05$ , two-tailed). You now have cause to run an additional group of 10 subjects. What do you think the probability is that the results will be significant, by a one-tailed test, separately for this group?”

Figure 1.13: Screenshot of first paragraph in Tversky and Kahneman, 1971.

Tversky Kahneman 48% 9 (Miller, 2009)

**Q10:** p p = 0.65

A. II B. C. p D. p

**Q11:** p t 0.05 p = 0.34

A. p > 0.05 B. p > 0.05 c. 0 D.

**Q12:** p p < 0.05

A. p < 0.05 B. p C. D.

**Q13:**

A. B. 0.20 C.  
D.

**Q14:** p

A. p B. p C. p D.  
p

### 1.8.2

1.       $p$
2.               $p$
- 3.
4.       $p$
5.  $p$
6.       $p$
7.       $p$
8.       $p$
9.              1              5%
10.     $1 - p$      $1 - 0.05 = 0.95$

# References

- Anvari, F., Kievit, R., Lakens, D., Pennington, C. R., Przybylski, A. K., Tiokhin, L., Wiernik, B. M., & Orben, A. (2021). Not all effects are indispensable: Psychological science requires verifiable lines of reasoning for whether an effect matters. *Perspectives on Psychological Science*. <https://doi.org/10.31234/osf.io/g3vtr>
- Appelbaum, M., Cooper, H., Kline, R. B., Mayo-Wilson, E., Nezu, A. M., & Rao, S. M. (2018). Journal article reporting standards for quantitative research in psychology: The APA Publications and Communications Board task force report. *American Psychologist*, 73(1), 3. <https://doi.org/10.1037/amp0000191>
- Bland, M. (2015). *An introduction to medical statistics* (Fourth edition). Oxford University Press.
- Cox, D. R. (1958). Some Problems Connected with Statistical Inference. *Annals of Mathematical Statistics*, 29(2), 357–372. <https://doi.org/10.1214/aoms/1177706618>
- Cumming, G. (2008). Replication and  $p$  Intervals:  $p$  Values Predict the Future Only Vaguely, but Confidence Intervals Do Much Better. *Perspectives on Psychological Science*, 3(4), 286–300. <https://doi.org/10.1111/j.1745-6924.2008.00079.x>
- Dienes, Z. (2008). *Understanding psychology as a science: An introduction to scientific and statistical inference*. Palgrave Macmillan.
- Fisher, Ronald Aylmer. (1935). *The design of experiments*. Oliver And Boyd; Edinburgh; London.
- Fisher, Ronald A. (1956). *Statistical methods and scientific inference: Vol. viii*. Hafner Publishing Co.
- Good, I. J. (1992). The Bayes/Non-Bayes compromise: A brief review. *Journal of the American Statistical Association*, 87(419), 597–606. <https://doi.org/10.2307/2290192>
- Gosset, W. S. (1904). *The Application of the "Law of Error" to the Work of the Brewery* (1 vol 8; pp. 3–16). Arthur Guinness & Son, Ltd.
- Greenland, S., Senn, S. J., Rothman, K. J., Carlin, J. B., Poole, C., Goodman, S. N., & Altman, D. G. (2016). Statistical tests,  $P$  values, confidence intervals, and power: A guide to misinterpretations. *European Journal of Epidemiology*, 31(4), 337–350. <https://doi.org/10.1007/s10654-016-0149-3>
- Hacking, I. (1965). *Logic of Statistical Inference*. Cambridge University Press.
- Harms, C., & Lakens, D. (2018). Making 'null effects' informative: Statistical techniques and inferential frameworks. *Journal of Clinical and Translational Research*, 3, 382–393. <https://doi.org/10.18053/jctres.03.2017S2.007>
- Hempel, C. G. (1966). *Philosophy of natural science* (Nachdr.). Prentice-Hall.
- Hung, H. M. J., O'Neill, R. T., Bauer, P., & Kohne, K. (1997). The Behavior of the  $P$ -Value

- When the Alternative Hypothesis is True. *Biometrics*, 53(1), 11–22. <https://doi.org/10.2307/2533093>
- Johansson, T. (2011). Hail the impossible: P-values, evidence, and likelihood. *Scandinavian Journal of Psychology*, 52(2), 113–125. <https://doi.org/10.1111/j.1467-9450.2010.00852.x>
- Lakens, D. (2022). Why P values are not measures of evidence. *Trends in Ecology & Evolution*, 37(4), 289–290. <https://doi.org/10.1016/j.tree.2021.12.006>
- Leamer, E. E. (1978). *Specification Searches: Ad Hoc Inference with Nonexperimental Data* (1 edition). Wiley.
- Lehmann, E. L., & Romano, J. P. (2005). *Testing statistical hypotheses* (3rd ed). Springer.
- Lindley, D. V. (1957). A statistical paradox. *Biometrika*, 44(1/2), 187–192.
- Maier, M., & Lakens, D. (2022). Justify your alpha: A primer on two practical approaches. *Advances in Methods and Practices in Psychological Science*. <https://doi.org/10.31234/osf.io/ts4r6>
- Miller, J. (2009). What is the probability of replicating a statistically significant effect? *Psychonomic Bulletin & Review*, 16(4), 617–640. <https://doi.org/10.3758/PBR.16.4.617>
- Neyman, J. (1957). "Inductive Behavior" as a Basic Concept of Philosophy of Science. *Revue de l'Institut International de Statistique / Review of the International Statistical Institute*, 25(1/3), 7. <https://doi.org/10.2307/1401671>
- Neyman, J., & Pearson, E. S. (1933). On the problem of the most efficient tests of statistical hypotheses. *Philosophical Transactions of the Royal Society of London A: Mathematical, Physical and Engineering Sciences*, 231(694-706), 289–337. <https://doi.org/10.1098/rsta.1933.0009>
- Niiniluoto, I. (1998). Verisimilitude: The Third Period. *The British Journal for the Philosophy of Science*, 49, 1–29.
- Popper, K. R. (2002). *The logic of scientific discovery*. Routledge.
- Schweder, T., & Hjort, N. L. (2016). *Confidence, Likelihood, Probability: Statistical Inference with Confidence Distributions*. Cambridge University Press. <https://doi.org/10.1017/CBO9781139046671>
- Spanos, A. (2013). Who should be afraid of the Jeffreys-Lindley paradox? *Philosophy of Science*, 80(1), 73–93. <https://doi.org/10.1086/668875>
- Tversky, A., & Kahneman, D. (1971). Belief in the law of small numbers. *Psychological Bulletin*, 76(2), 105–110. <https://doi.org/10.1037/h0031322>
- Ulrich, R., & Miller, J. (2018). Some properties of p-curves, with an application to gradual publication bias. *Psychological Methods*, 23(3), 546–560. <https://doi.org/10.1037/met0000125>
- Zabell, S. L. (1992). R. A. Fisher and Fiducial Argument. *Statistical Science*, 7(3), 369–387. <https://doi.org/10.1214/ss/1177011233>