

BFF

```
## Package 'BFF' version 3.0.1 for Bayesian hypothesis testing.
## Type 'citation("BFF")' for citing this R package in publications

## Loading required package: lattice

##
## Attaching package: 'BSDA'

## The following object is masked from 'package:datasets':
##
##   Orange
```

Bayes factors are an alternative to p-values for evaluating hypothesis tests. However, unlike p-values, Bayes factors are able to provide evidence for a null hypothesis. Bayes factors also have a clear interpretation: a larger Bayes factor shows more evidence for a hypothesis, as opposed to p-values (can anyone tell the difference between 0.05 and 0.06?). Bayes factors have in the past had limited acceptance due to computational issues and difficulty in selecting a prior. Recent work (see ‘Bayes factor functions for reporting outcomes of hypothesis tests,’ 2023 and ‘On the use of non-local prior densities in Bayesian hypothesis tests,’ 2010) introduced the idea of using non-local priors to calculate Bayes factors. This package implements “Bayes Factor Functions” (or BFFS). In contrast to a single Bayes factor, BFFs express Bayes factors as a function of the prior densities used to define the alternative hypotheses.

Interpreting Bayes factors is usually done on the log scale (also called the weight of evidence, or WoE). On this scale, a positive Bayes factor represents evidence for the alternative hypothesis. A negative Bayes factor represents evidence for the null hypothesis. As a rule of thumb, the following table can be used to interpret a Bayes factor. However, these are just guidelines and some fields may require higher or lower thresholds of evidence.

WoE	Interpretation
(-1, 1)	No strong evidence for either H_0 or H_1
(1, 3)	Positive evidence for H_1
(-1, -3)	Positive evidence for H_0
(3, 5)	Strong evidence for H_1
(-3, -5)	Strong evidence for H_0
(5, ∞)	Very strong evidence for H_1
(-5, $-\infty$)	Very strong evidence for H_0

Table 1: Common interpretations of the Weight of Evidence

This package provides the Bayes factor values for different effect sizes from 0 to 1. A small effect size is usually considered from 0.2 to 0.5, medium effect sizes from 0.5 to 0.8, and large effect sizes as greater than 0.8.

Using this package is very similar to using the familiar t, z, χ^2 , and F tests in R. You will need the same information - the test statistic, degrees of freedom, and sample size. A graph is produced that shows the BFF curve over the different effect sizes.

For evaluating evidence from multiple studies (see ‘Bayes factor functions,’ 2023 (arxiv)), the parameter ‘r’ can also be set. The default value for r is 1, but ‘r’ can be suggested that maximizes the Bayes factor at each tau by setting the ‘maximization’ argument in each test to “TRUE.”

The following examples will show how the BFF package calculates Bayes factors based on test statistics

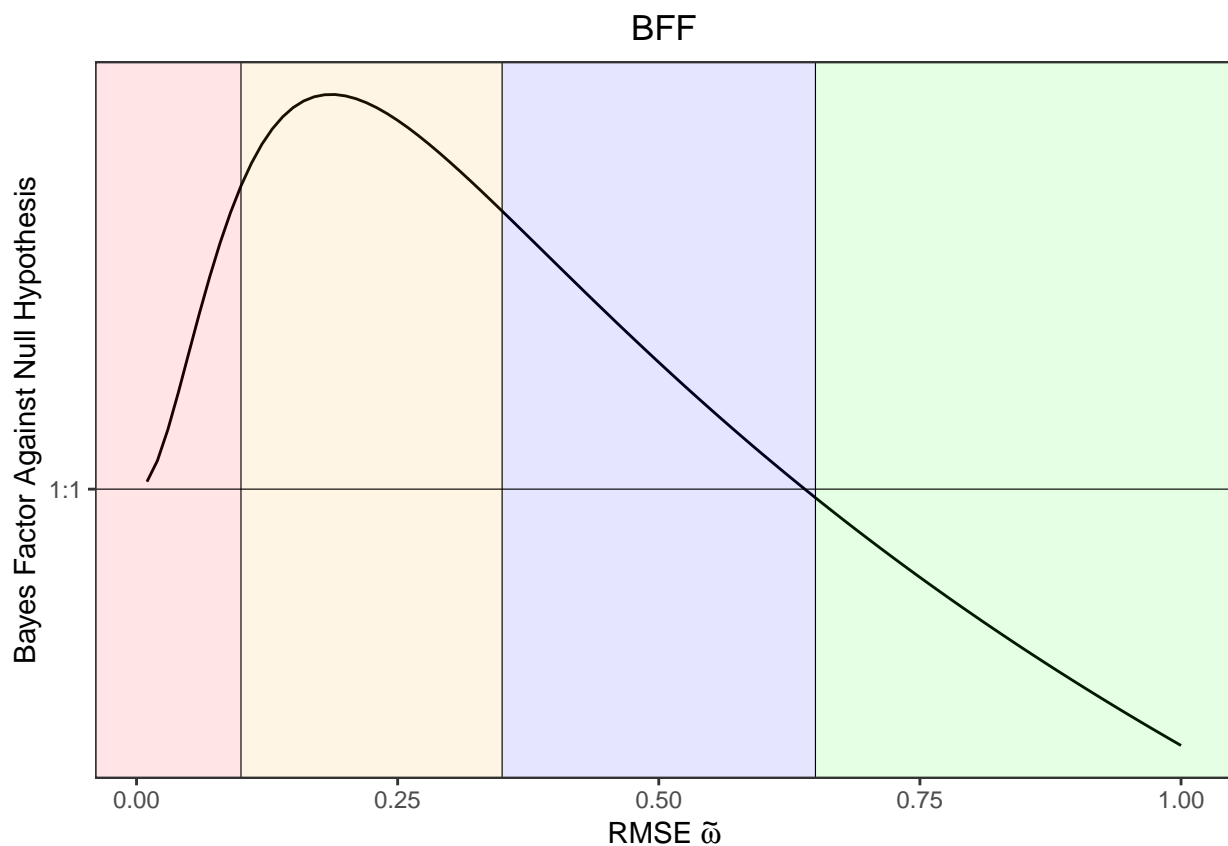
z - test

```
# generating some data
n = 100
data_one = rnorm(n = n, mean = 0.2, sd = 1)
data_two = rnorm(n = n, mean = 0.1, sd = 1)

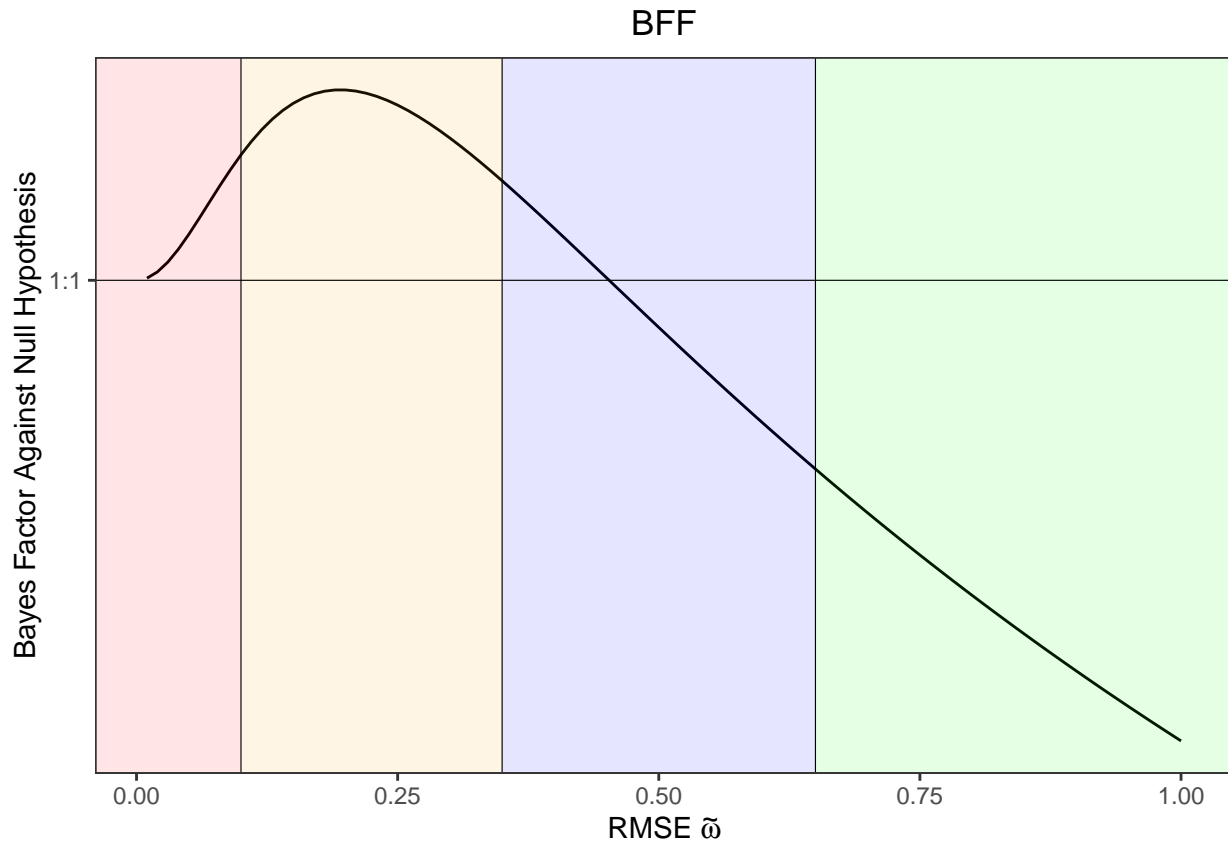
# calculating test statistics using z.test
# one-sample z-test
z_score_one = z.test(x = data_one, sigma.x = 1)$statistic
# two-sample z-test
z_score_two = z.test(x = data_one, y = data_two, sigma.x = 1, sigma.y = 1)$statistic
```

Calculating BFF using z_test_BFF

```
# default r and tau2
z_BFF_one = z_test_BFF(z_stat = z_score_one, n = 100, save = FALSE) #one sample z-test
```



```
z_BFF_two = z_test_BFF(z_stat = z_score_two, one_sample = FALSE, n1 = 100, n2 = 100, save = FALSE) #two
```



```
# default r and user specified tau2
# single tau2
z_test_BFF(z_stat = z_score_one, n = 100, save = FALSE, tau2 = 0.5) #one sample z-test
```

```
## $BFF
##      z
## 1.415889
##
## $tau2
## [1] 0.5
```

```
z_test_BFF(z_stat = z_score_two, one_sample = FALSE, n1 = 100, n2 = 100, save = FALSE, tau2 = 0.5) #two
```

```
## $BFF
##      z
## 0.6898734
##
## $tau2
## [1] 0.5
```

```
# vector of tau2 values
z_test_BFF(z_stat = z_score_one, n = 100, save = FALSE, tau2 = c(0.5, 0.8)) #one sample z-test
```

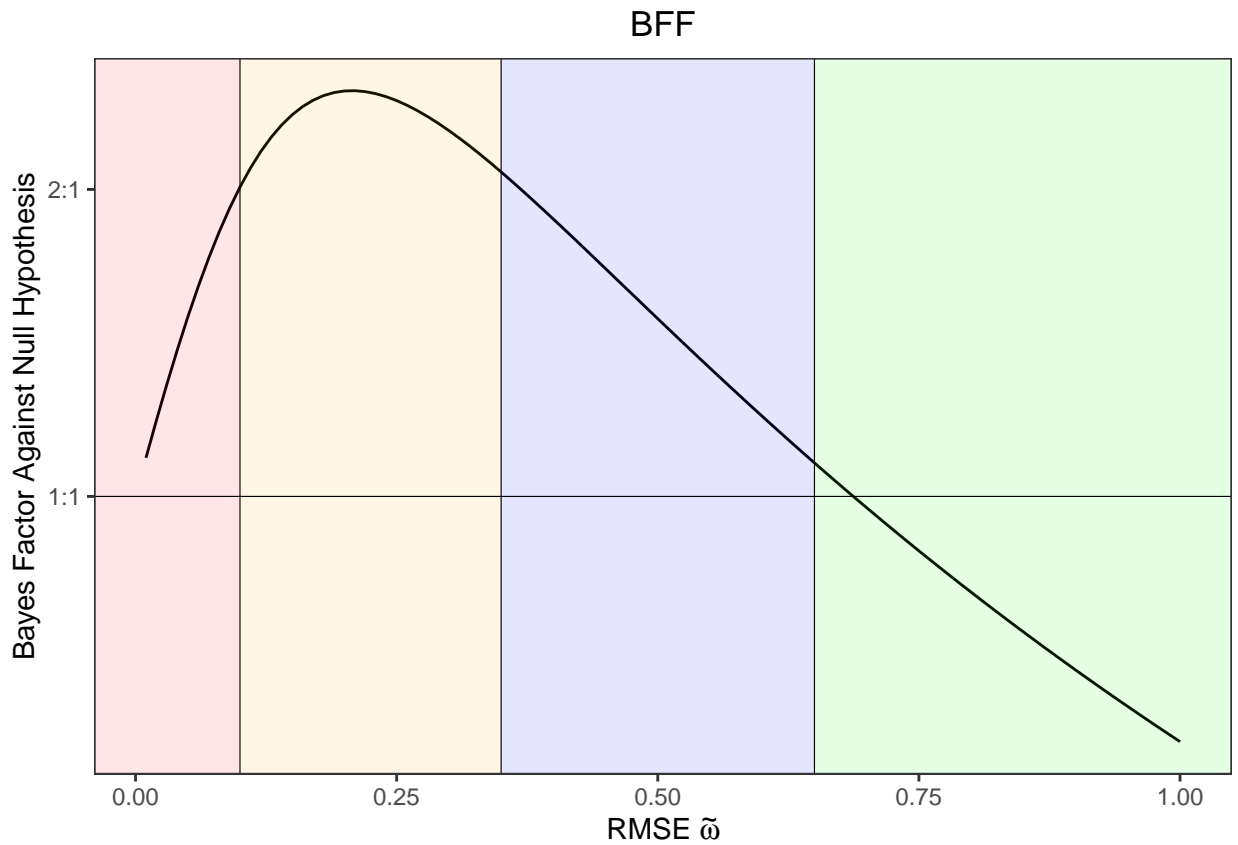
```
## $BFF
## [1] 1.415889 1.658816
```

```
##
## $tau2
## [1] 0.5 0.8

z_test_BFF(z_stat = z_score_two, one_sample = FALSE, n1 = 100, n2 = 100, save = FALSE, tau2 = c(0.5, 0.8))

## $BFF
## [1] 0.6898734 0.7621061
##
## $tau2
## [1] 0.5 0.8

# user specified r and default tau2
z_test_BFF(z_stat = z_score_one, n = 100, save = FALSE, r = 2) #one sample z-test, integer r >1 (higher)
```



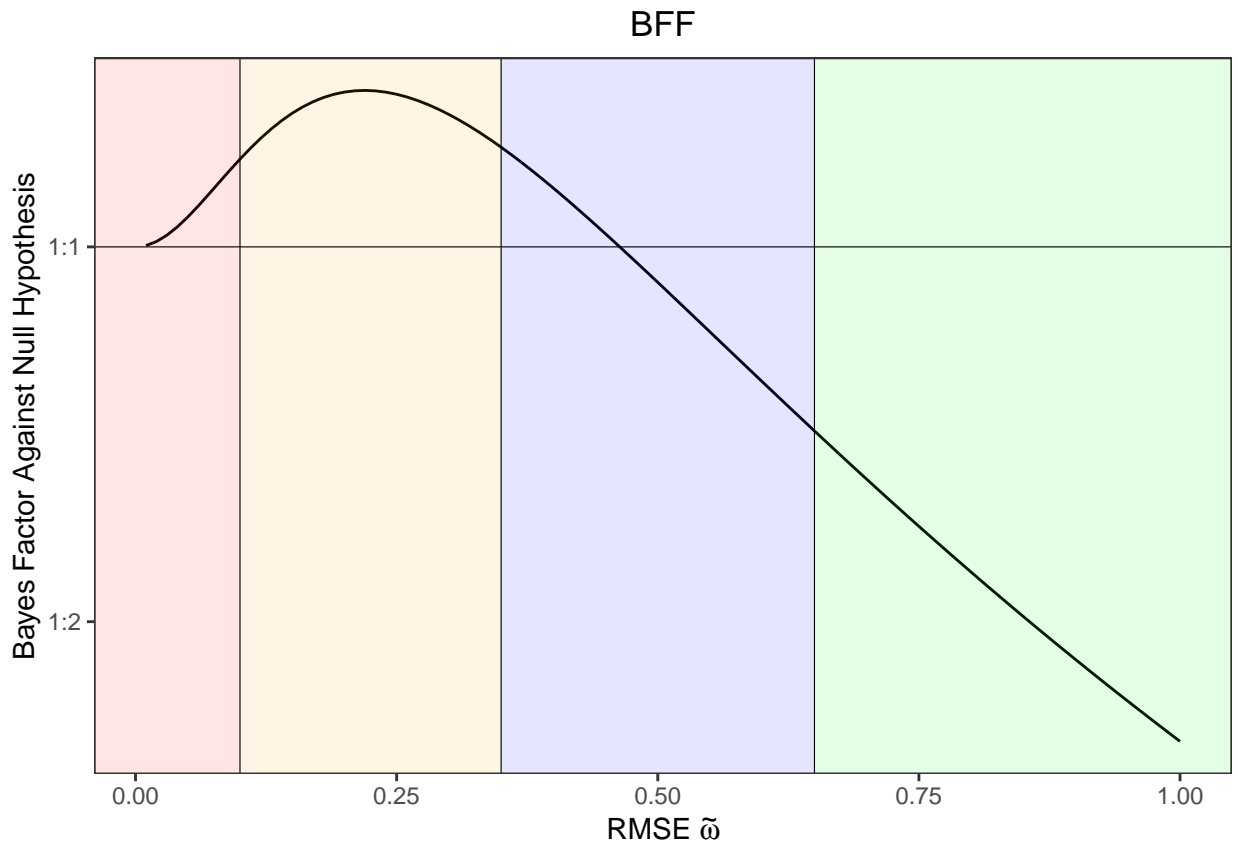
```
## $log_BFF
## [1] 0.25158480 0.49574162 0.73080952 0.95523057 1.16760433 1.36673382
## [7] 1.55165943 1.72167870 1.87635171 2.01549320 2.13915363 2.24759214
## [13] 2.34124458 2.42068938 2.48661369 2.53978169 2.58100616 2.61112402
## [19] 2.63097610 2.64139094 2.64317239 2.63709053 2.62387545 2.60421331
## [25] 2.57874438 2.54806242 2.51271528 2.47320627 2.42999605 2.38350497
## [31] 2.33411554 2.28217511 2.22799841 2.17187022 2.11404780 2.05476328
## [37] 1.99422586 1.93262392 1.87012691 1.80688716 1.74304147 1.67871259
## [43] 1.61401064 1.54903424 1.48387173 1.41860211 1.35329598 1.28801637
## [49] 1.22281947 1.15775533 1.09286844 1.02819831 0.96377993 0.89964422
```

```

## [55] 0.83581846 0.77232662 0.70918970 0.64642604 0.58405153 0.52207991
## [61] 0.46052296 0.39939069 0.33869153 0.27843246 0.21861919 0.15925626
## [67] 0.10034719 0.04189453 -0.01609997 -0.07363536 -0.13071132 -0.18732817
## [73] -0.24348675 -0.29918839 -0.35443486 -0.40922829 -0.46357118 -0.51746631
## [79] -0.57091674 -0.62392575 -0.67649684 -0.72863367 -0.78034007 -0.83162002
## [85] -0.88247757 -0.93291691 -0.98294229 -1.03255803 -1.08176851 -1.13057814
## [91] -1.17899136 -1.22701266 -1.27464651 -1.32189741 -1.36876983 -1.41526826
## [97] -1.46139717 -1.50716100 -1.55256418 -1.59761111
##
## $effect_size
## [1] 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10 0.11 0.12 0.13 0.14 0.15
## [16] 0.16 0.17 0.18 0.19 0.20 0.21 0.22 0.23 0.24 0.25 0.26 0.27 0.28 0.29 0.30
## [31] 0.31 0.32 0.33 0.34 0.35 0.36 0.37 0.38 0.39 0.40 0.41 0.42 0.43 0.44 0.45
## [46] 0.46 0.47 0.48 0.49 0.50 0.51 0.52 0.53 0.54 0.55 0.56 0.57 0.58 0.59 0.60
## [61] 0.61 0.62 0.63 0.64 0.65 0.66 0.67 0.68 0.69 0.70 0.71 0.72 0.73 0.74 0.75
## [76] 0.76 0.77 0.78 0.79 0.80 0.81 0.82 0.83 0.84 0.85 0.86 0.87 0.88 0.89 0.90
## [91] 0.91 0.92 0.93 0.94 0.95 0.96 0.97 0.98 0.99 1.00
##
## $log_BFF_max_RMSE
## [1] 2.643172
##
## $max_RMSE
## [1] 0.21

```

```
z_test_BFF(z_stat = z_score_two, one_sample = FALSE, n1 = 100, n2 = 100, save = FALSE, r = 2) #two samp
```



```
## $log_BFF
```

```

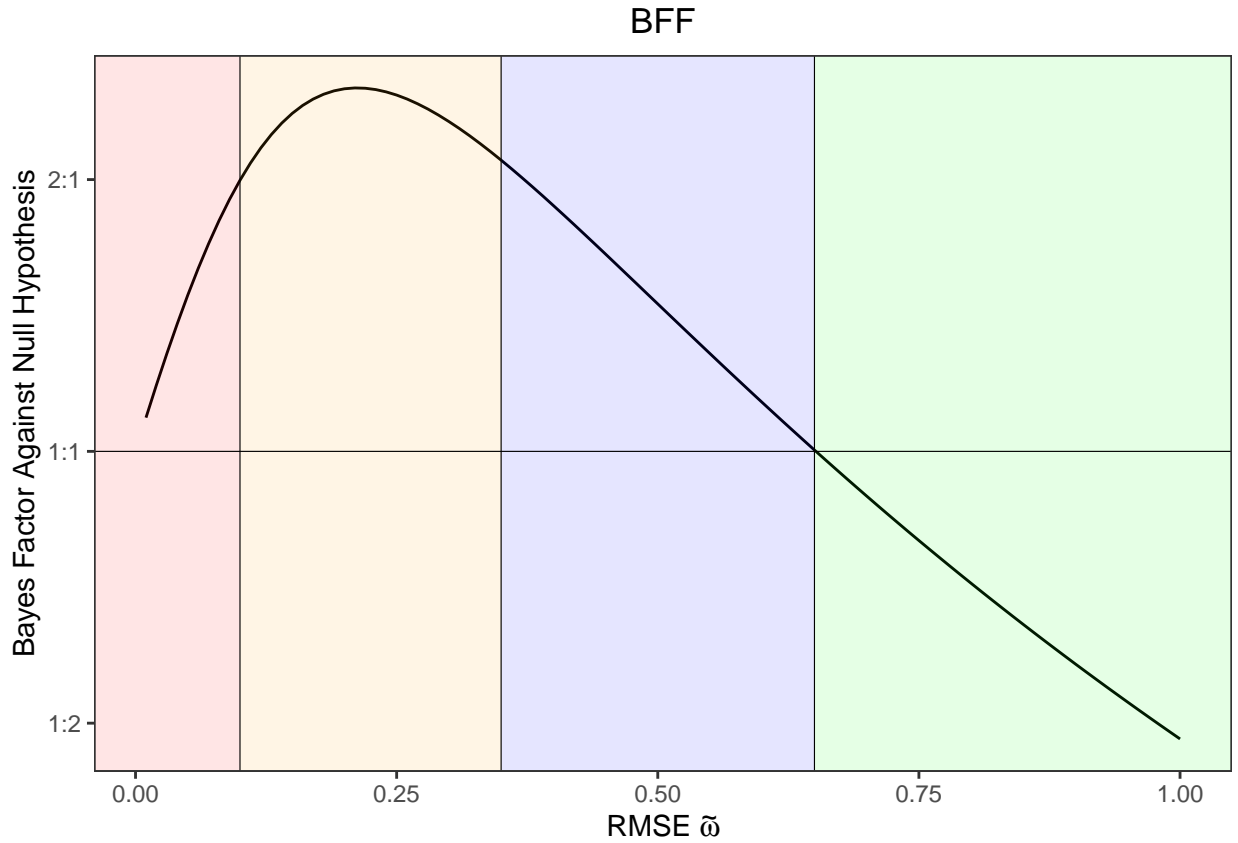
## [1] 0.007206981 0.028364953 0.062160465 0.106631290 0.159433496
## [6] 0.218106013 0.280283741 0.343838815 0.406953296 0.468139103
## [11] 0.526223778 0.580317876 0.629775134 0.674152214 0.713171588
## [16] 0.746689056 0.774666170 0.797147264 0.814240528 0.826102520
## [21] 0.832925548 0.834927422 0.832343166 0.825418338 0.814403682
## [26] 0.799550884 0.781109233 0.759323034 0.734429647 0.706658034
## [31] 0.676227728 0.643348141 0.608218158 0.571025941 0.531948923
## [36] 0.491153929 0.448797413 0.405025768 0.359975697 0.313774629
## [41] 0.266541150 0.218385463 0.169409840 0.119709082 0.069370968
## [46] 0.018476687 -0.032898733 -0.084686022 -0.136821283 -0.189245620
## [51] -0.241904793 -0.294748888 -0.347732010 -0.400811988 -0.453950110
## [56] -0.507110867 -0.560261714 -0.613372854 -0.666417027 -0.719369326
## [61] -0.772207016 -0.824909369 -0.877457514 -0.929834296 -0.982024142
## [66] -1.034012942 -1.085787936 -1.137337613 -1.188651611 -1.239720629
## [71] -1.290536347 -1.341091348 -1.391379049 -1.441393634 -1.491129997
## [76] -1.540583684 -1.589750841 -1.638628170 -1.687212881 -1.735502655
## [81] -1.783495604 -1.831190236 -1.878585427 -1.925680384 -1.972474625
## [86] -2.018967949 -2.065160414 -2.111052316 -2.156644166 -2.201936674
## [91] -2.246930733 -2.291627399 -2.336027880 -2.380133519 -2.423945785
## [96] -2.467466258 -2.510696622 -2.553638650 -2.596294201 -2.638665204
##
## $effect_size
## [1] 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10 0.11 0.12 0.13 0.14 0.15
## [16] 0.16 0.17 0.18 0.19 0.20 0.21 0.22 0.23 0.24 0.25 0.26 0.27 0.28 0.29 0.30
## [31] 0.31 0.32 0.33 0.34 0.35 0.36 0.37 0.38 0.39 0.40 0.41 0.42 0.43 0.44 0.45
## [46] 0.46 0.47 0.48 0.49 0.50 0.51 0.52 0.53 0.54 0.55 0.56 0.57 0.58 0.59 0.60
## [61] 0.61 0.62 0.63 0.64 0.65 0.66 0.67 0.68 0.69 0.70 0.71 0.72 0.73 0.74 0.75
## [76] 0.76 0.77 0.78 0.79 0.80 0.81 0.82 0.83 0.84 0.85 0.86 0.87 0.88 0.89 0.90
## [91] 0.91 0.92 0.93 0.94 0.95 0.96 0.97 0.98 0.99 1.00
##
## $log_BFF_max_RMSE
## [1] 0.8349274
##
## $max_RMSE
## [1] 0.22

```

```

z_test_BFF(z_stat = z_score_one, n = 100, save = FALSE, r = 2.5) #one sample z-test, continuous r (frac

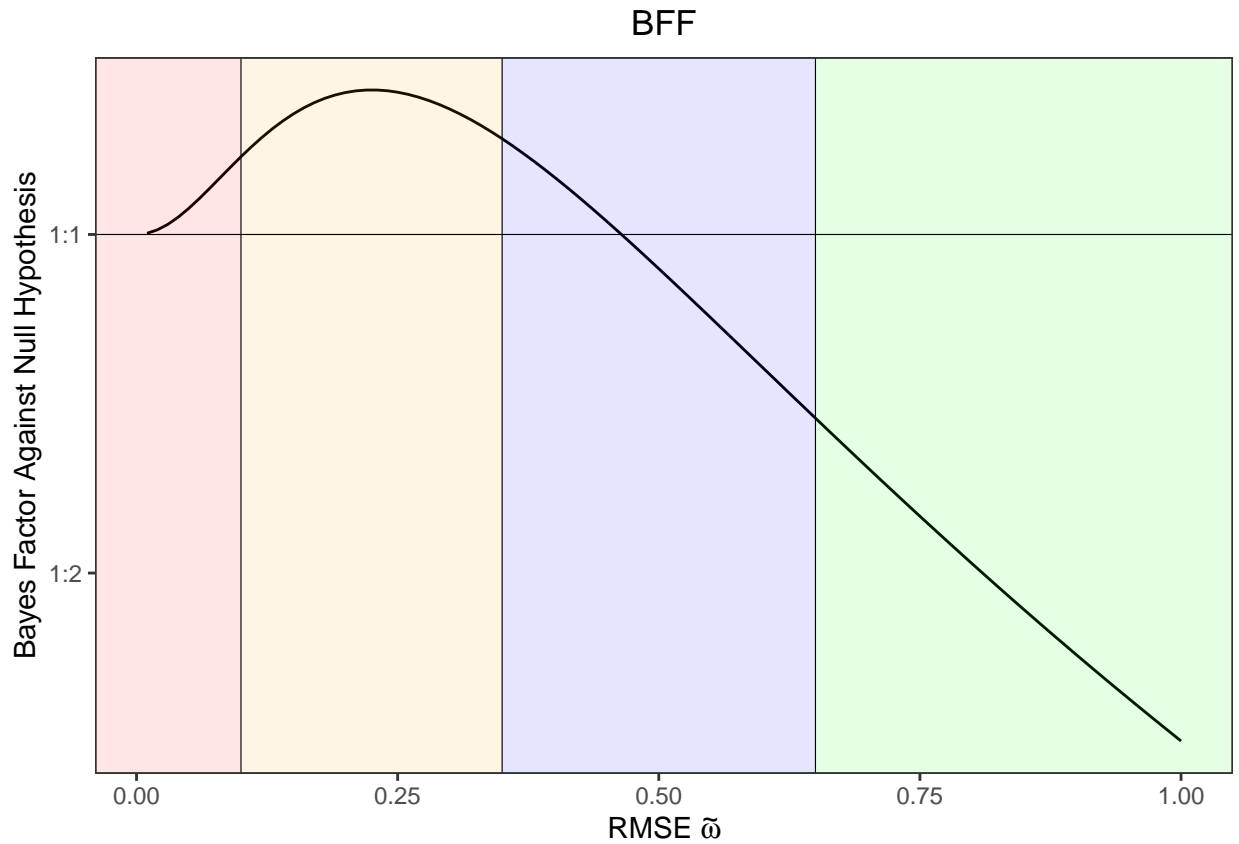
```



```
## $log_BFF
## [1] 0.248149143 0.488411797 0.719474318 0.940111415 1.149220346
## [6] 1.345849905 1.529222434 1.698747748 1.854028622 1.994858245
## [11] 2.121210589 2.233225122 2.331187441 2.415507455 2.486696591
## [16] 2.545345280 2.592101679 2.627652309 2.652705019 2.667974449
## [21] 2.674170006 2.671986233 2.662095352 2.645141753 2.621738138
## [26] 2.592463061 2.557859610 2.518435008 2.474660918 2.426974289
## [31] 2.375778605 2.321445393 2.264315926 2.204703017 2.142892862
## [36] 2.079146877 2.013703500 1.946779934 1.878573812 1.809264774
## [41] 1.739015951 1.667975351 1.596277149 1.524042881 1.451382551
## [46] 1.378395645 1.305172063 1.231792976 1.158331609 1.084853958
## [51] 1.011419438 0.938081484 0.864888094 0.791882318 0.719102713
## [56] 0.646583753 0.574356197 0.502447432 0.430881781 0.359680780
## [61] 0.288863438 0.218446463 0.148444477 0.078870209 0.009734664
## [66] -0.058952715 -0.127183902 -0.194952155 -0.262251903 -0.329078629
## [71] -0.395428777 -0.461299655 -0.526689362 -0.591596703 -0.656021127
## [76] -0.719962664 -0.783421864 -0.846399750 -0.908897769 -0.970917748
## [81] -1.032461856 -1.093532568 -1.154132631 -1.214265035 -1.273932986
## [86] -1.333139882 -1.391889288 -1.450184917 -1.508030612 -1.565430327
## [91] -1.622388112 -1.678908098 -1.734994487 -1.790651536 -1.845883549
## [96] -1.900694867 -1.955089859 -2.009072912 -2.062648426 -2.115820807
##
## $effect_size
## [1] 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10 0.11 0.12 0.13 0.14 0.15
## [16] 0.16 0.17 0.18 0.19 0.20 0.21 0.22 0.23 0.24 0.25 0.26 0.27 0.28 0.29 0.30
## [31] 0.31 0.32 0.33 0.34 0.35 0.36 0.37 0.38 0.39 0.40 0.41 0.42 0.43 0.44 0.45
## [46] 0.46 0.47 0.48 0.49 0.50 0.51 0.52 0.53 0.54 0.55 0.56 0.57 0.58 0.59 0.60
```

```
## [61] 0.61 0.62 0.63 0.64 0.65 0.66 0.67 0.68 0.69 0.70 0.71 0.72 0.73 0.74 0.75
## [76] 0.76 0.77 0.78 0.79 0.80 0.81 0.82 0.83 0.84 0.85 0.86 0.87 0.88 0.89 0.90
## [91] 0.91 0.92 0.93 0.94 0.95 0.96 0.97 0.98 0.99 1.00
##
## $log_BFF_max_RMSE
## [1] 2.67417
##
## $max_RMSE
## [1] 0.21
```

```
z_test_BFF(z_stat = z_score_two, one_sample = FALSE, n1 = 100, n2 = 100, save = FALSE, r = 2.5) #two sa
```



```
## $log_BFF
## [1] 0.006920794 0.027262832 0.059830577 0.102829227 0.154099920
## [6] 0.211356187 0.272378351 0.335146285 0.397911456 0.459220817
## [11] 0.517908481 0.573069237 0.624024245 0.670285440 0.711522222
## [16] 0.747532054 0.778215374 0.803554638 0.823597018 0.838440209
## [21] 0.848220812 0.853104843 0.853279971 0.848949176 0.840325568
## [26] 0.827628167 0.811078474 0.790897706 0.767304583 0.740513580
## [31] 0.710733562 0.678166745 0.643007935 0.605443986 0.565653450
## [36] 0.523806380 0.480064262 0.434580043 0.387498252 0.338955177
## [41] 0.289079092 0.237990527 0.185802560 0.132621130 0.078545361
## [46] 0.023667892 -0.031924794 -0.088152040 -0.144938696 -0.202214801
## [51] -0.259915283 -0.317979663 -0.376351778 -0.434979504 -0.493814512
## [56] -0.552812013 -0.611930536 -0.671131710 -0.730380055 -0.789642791
## [61] -0.848889657 -0.908092741 -0.967226318 -1.026266703 -1.085192109
```



```

## [66] -1.143982517 -1.202619552 -1.261086370 -1.319367550 -1.377448998
## [71] -1.435317848 -1.492962380 -1.550371938 -1.607536854 -1.664448378
## [76] -1.721098615 -1.777480460 -1.833587545 -1.889414184 -1.944955326
## [81] -2.000206506 -2.055163806 -2.109823815 -2.164183588 -2.218240616
## [86] -2.271992794 -2.325438388 -2.378576010 -2.431404592 -2.483923361
## [91] -2.536131817 -2.588029713 -2.639617033 -2.690893978 -2.741860946
## [96] -2.792518519 -2.842867445 -2.892908627 -2.942643112 -2.992072073
##
## $effect_size
## [1] 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10 0.11 0.12 0.13 0.14 0.15
## [16] 0.16 0.17 0.18 0.19 0.20 0.21 0.22 0.23 0.24 0.25 0.26 0.27 0.28 0.29 0.30
## [31] 0.31 0.32 0.33 0.34 0.35 0.36 0.37 0.38 0.39 0.40 0.41 0.42 0.43 0.44 0.45
## [46] 0.46 0.47 0.48 0.49 0.50 0.51 0.52 0.53 0.54 0.55 0.56 0.57 0.58 0.59 0.60
## [61] 0.61 0.62 0.63 0.64 0.65 0.66 0.67 0.68 0.69 0.70 0.71 0.72 0.73 0.74 0.75
## [76] 0.76 0.77 0.78 0.79 0.80 0.81 0.82 0.83 0.84 0.85 0.86 0.87 0.88 0.89 0.90
## [91] 0.91 0.92 0.93 0.94 0.95 0.96 0.97 0.98 0.99 1.00
##
## $log_BFF_max_RMSE
## [1] 0.85328
##
## $max_RMSE
## [1] 0.23

```

t - test

```

# generating some data
n = 100
data_one = rnorm(n = n, mean = -0.1)
data_two = rnorm(n = n, mean = 0.1)

# calculating test statistics using t.test
t_one = t.test(x = data_one)
t_two = t.test(x = data_one, y = data_two)
t_score_one = t_one$statistic
t_score_two = t_two$statistic
t_df_one = n - 1
t_df_two = 197.9

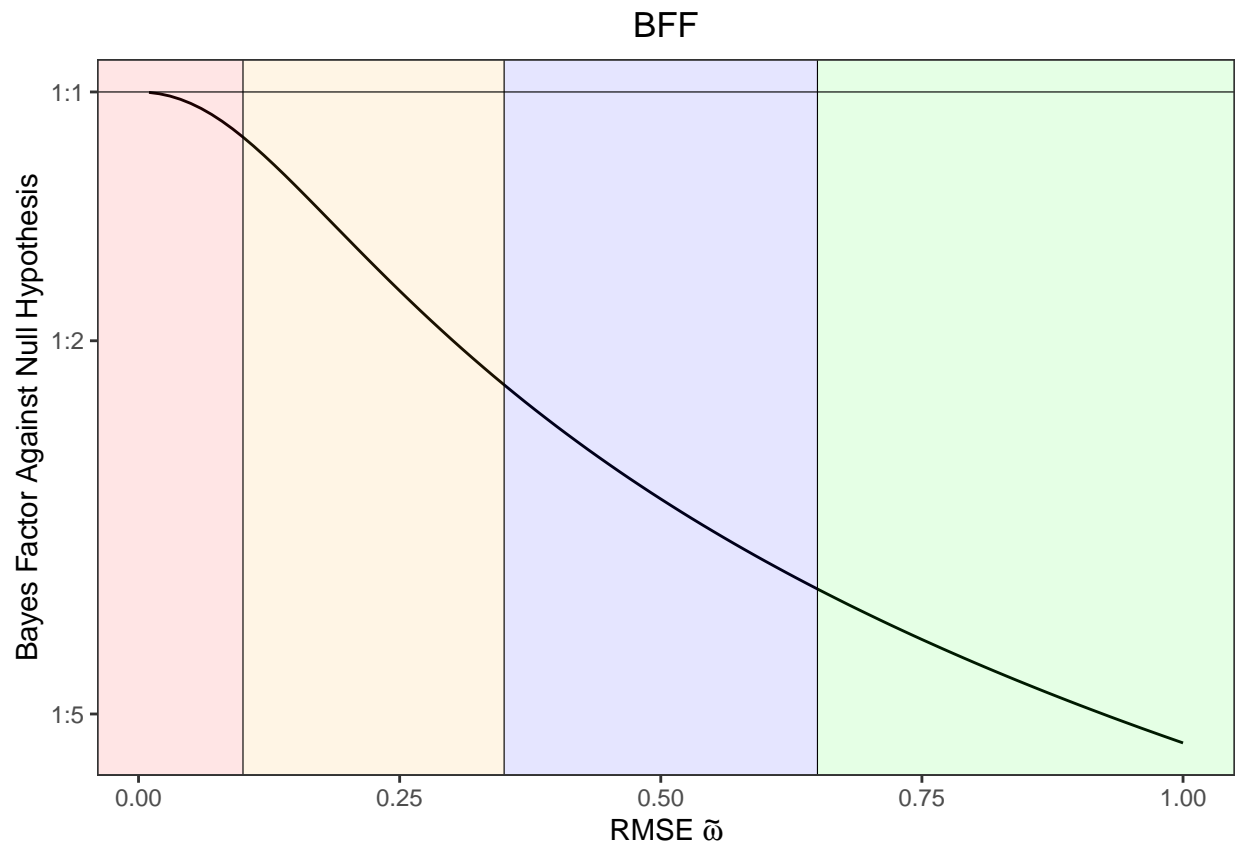
```

Calculating BFF using t_test_BFF

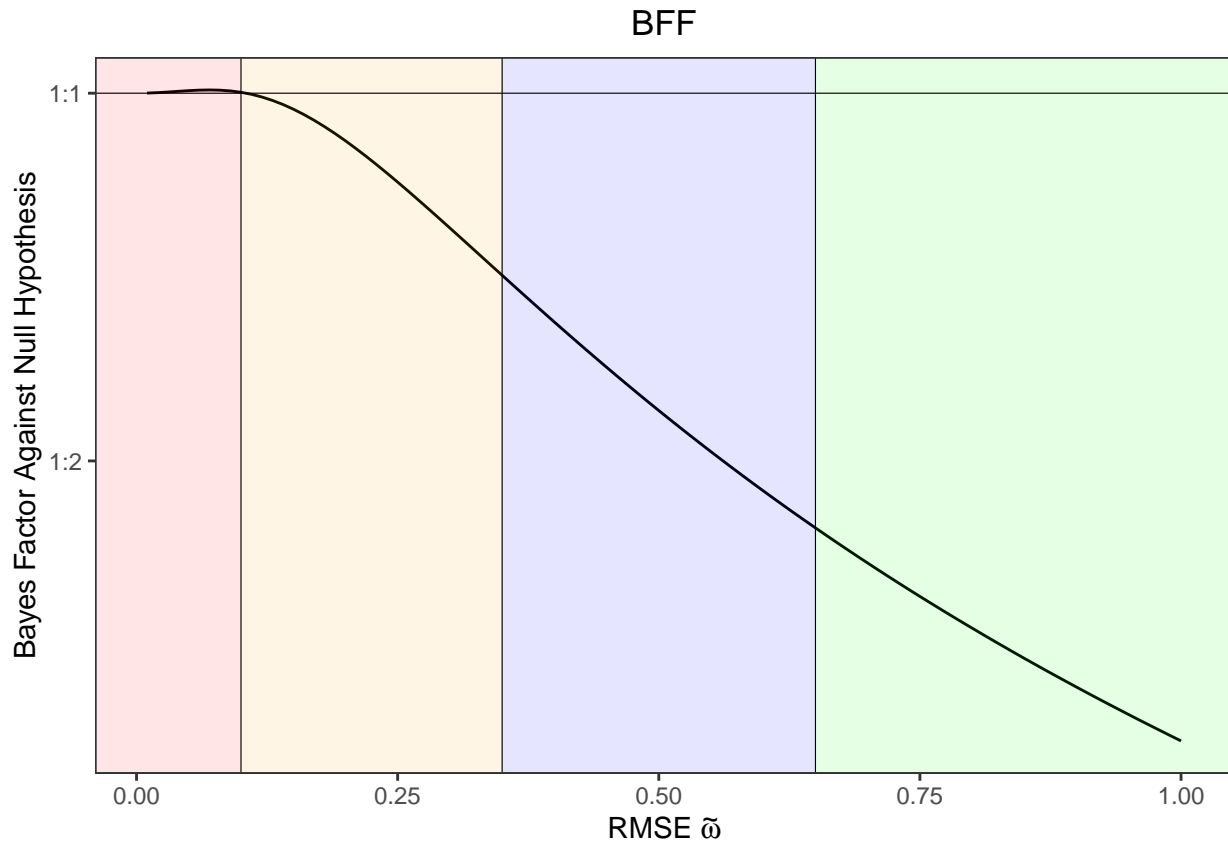
```

# default r and tau2
t_BFF_one = t_test_BFF(t_stat = t_score_one, df = t_df_one, n = 100, save = FALSE) #one sample t-test

```



```
t_BFF_two = t_test_BFF(t_stat = t_score_two, df = t_df_two, one_sample = FALSE, n1 = 100, n2 = 100, sa
```



```

# default r and user specified tau2
# single tau2
t_test_BFF(t_stat = t_score_one, df = t_df_one, n = 100, save = FALSE, tau2 = 0.5) #one sample t-test

## $BFF
##      t
## -0.3629073
##
## $tau2
## [1] 0.5

t_test_BFF(t_stat = t_score_two, df = t_df_two, one_sample = FALSE, n1 = 100, n2 = 100, save = FALSE,

## $BFF
##      t
## -0.06430682
##
## $tau2
## [1] 0.5

# vector of tau2 values
t_test_BFF(t_stat = t_score_one, df = t_df_one, n = 100, save = FALSE, tau2 = c(0.5, 0.8)) #one sample

## $BFF
##      t      t

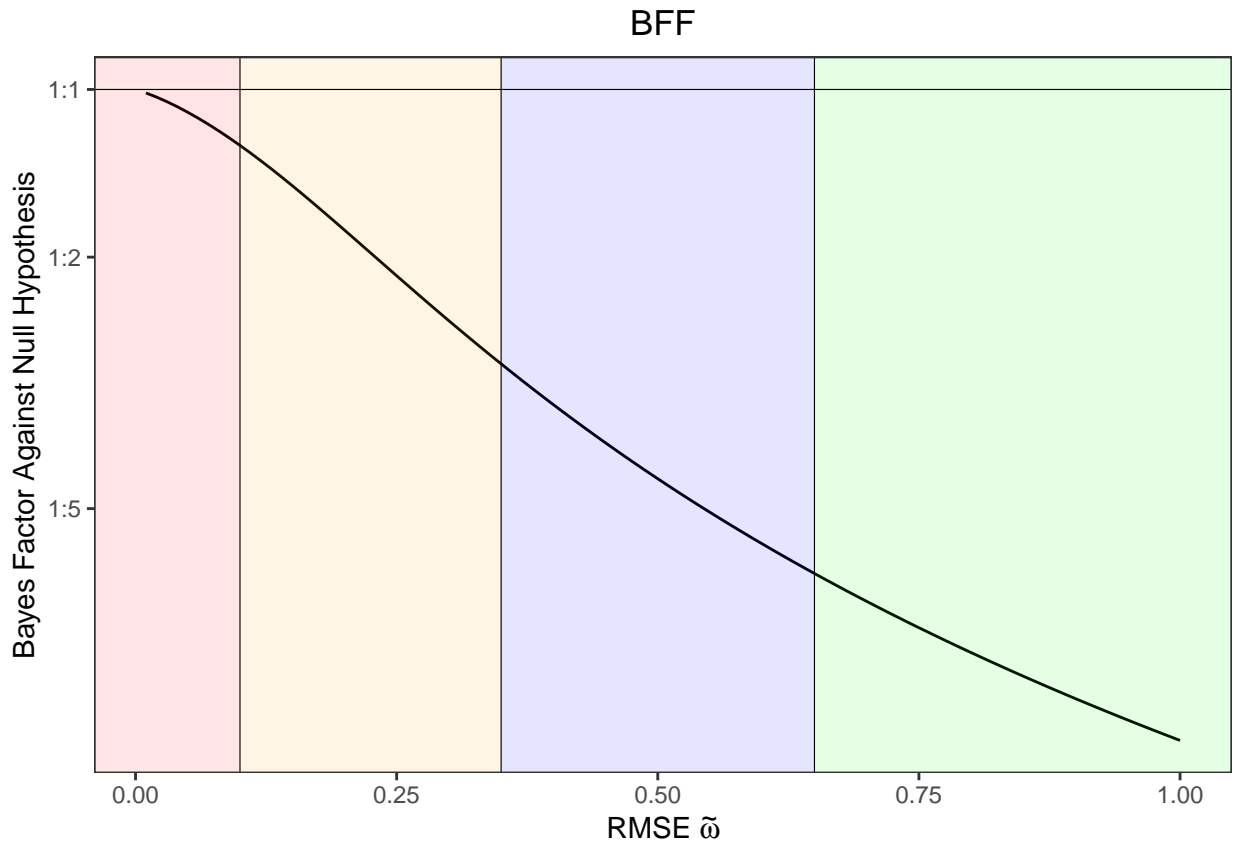
```

```
## -0.3629073 -0.5596548
##
## $tau2
## [1] 0.5 0.8
```

```
t_test_BFF(t_stat = t_score_two, df = t_df_two, one_sample = FALSE, n1 = 100, n2 = 100, save = FALSE,
```

```
## $BFF
##      t      t
## -0.06430682 -0.17786859
##
## $tau2
## [1] 0.5 0.8
```

```
# user specified r and default tau2
t_test_BFF(t_stat = t_score_one, df = t_df_one, n = 100, save = FALSE, r = 2) #one sample t-test, integ
```



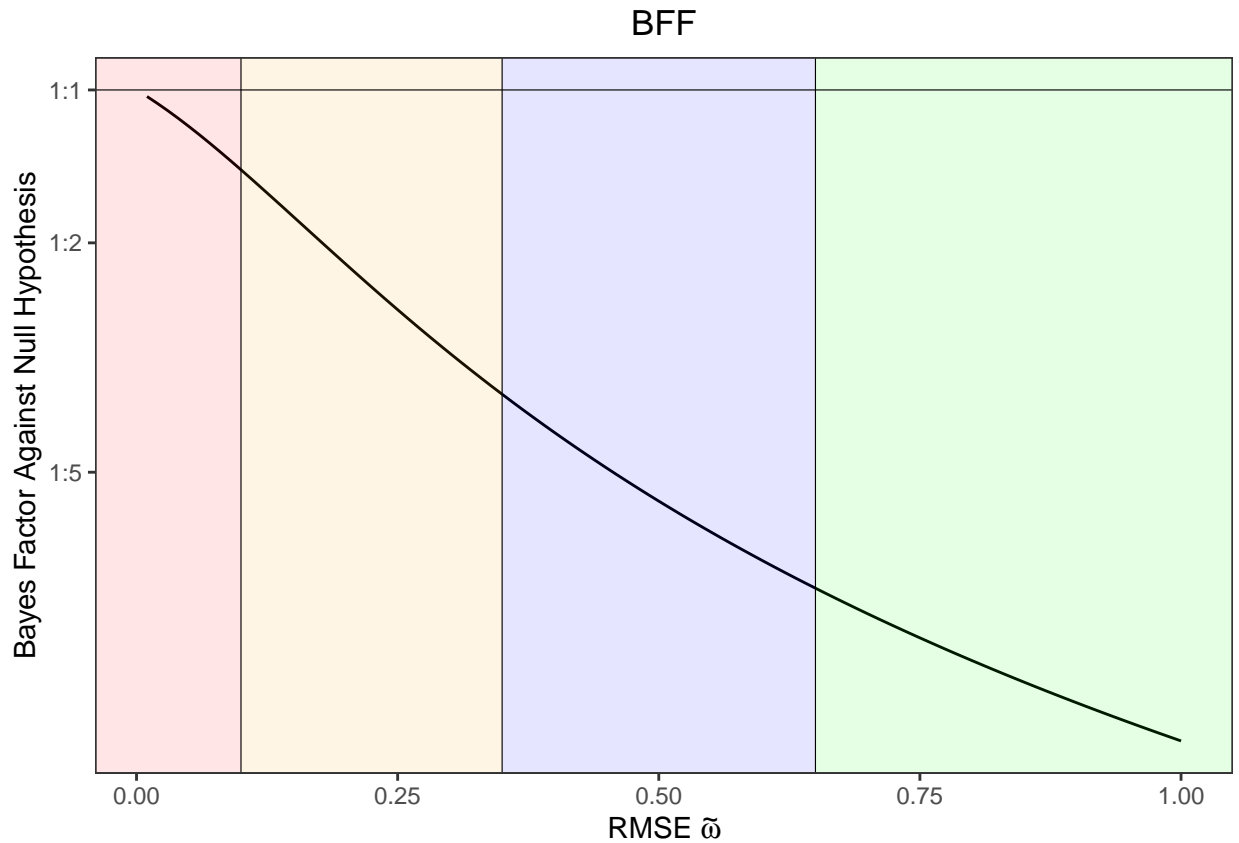
```
## $log_BFF
##      t      t      t      t      t      t
## -0.04178022 -0.09043782 -0.14536963 -0.20601973 -0.27189933 -0.34259265
##      t      t      t      t      t      t
## -0.41775036 -0.49707469 -0.58030075 -0.66717858 -0.75745865 -0.85088245
##      t      t      t      t      t      t
## -0.94717820 -1.04606079 -1.14723486 -1.25039963 -1.35525444 -1.46150413
##      t      t      t      t      t      t
```

```

## -1.56886385 -1.67706287 -1.78584751 -1.89498293 -2.00425428 -2.11346691
##      t      t      t      t      t      t
## -2.22244622 -2.33103692 -2.43910211 -2.54652209 -2.65319309 -2.75902595
##      t      t      t      t      t      t
## -2.86394480 -2.96788575 -3.07079569 -3.17263112 -3.27335708 -3.37294614
##      t      t      t      t      t      t
## -3.47137757 -3.56863644 -3.66471294 -3.75960172 -3.85330127 -3.94581341
##      t      t      t      t      t      t
## -4.03714285 -4.12729675 -4.21628436 -4.30411669 -4.39080627 -4.47636684
##      t      t      t      t      t      t
## -4.56081318 -4.64416091 -4.72642630 -4.80762615 -4.88777766 -4.96689832
##      t      t      t      t      t      t
## -5.04500579 -5.12211787 -5.19825237 -5.27342710 -5.34765978 -5.42096801
##      t      t      t      t      t      t
## -5.49336925 -5.56488076 -5.63551958 -5.70530252 -5.77424614 -5.84236672
##      t      t      t      t      t      t
## -5.90968027 -5.97620249 -6.04194881 -6.10693432 -6.17117385 -6.23468189
##      t      t      t      t      t      t
## -6.29747264 -6.35955998 -6.42095749 -6.48167846 -6.54173587 -6.60114240
##      t      t      t      t      t      t
## -6.65991045 -6.71805212 -6.77557925 -6.83250337 -6.88883577 -6.94458747
##      t      t      t      t      t      t
## -6.99976921 -7.05439149 -7.10846456 -7.16199842 -7.21500285 -7.26748738
##      t      t      t      t      t      t
## -7.31946132 -7.37093376 -7.42191357 -7.47240943 -7.52242978 -7.57198291
##      t      t      t      t      t      t
## -7.62107687 -7.66971954 -7.71791863 -7.76568164
##
## $effect_size
## [1] 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10 0.11 0.12 0.13 0.14 0.15
## [16] 0.16 0.17 0.18 0.19 0.20 0.21 0.22 0.23 0.24 0.25 0.26 0.27 0.28 0.29 0.30
## [31] 0.31 0.32 0.33 0.34 0.35 0.36 0.37 0.38 0.39 0.40 0.41 0.42 0.43 0.44 0.45
## [46] 0.46 0.47 0.48 0.49 0.50 0.51 0.52 0.53 0.54 0.55 0.56 0.57 0.58 0.59 0.60
## [61] 0.61 0.62 0.63 0.64 0.65 0.66 0.67 0.68 0.69 0.70 0.71 0.72 0.73 0.74 0.75
## [76] 0.76 0.77 0.78 0.79 0.80 0.81 0.82 0.83 0.84 0.85 0.86 0.87 0.88 0.89 0.90
## [91] 0.91 0.92 0.93 0.94 0.95 0.96 0.97 0.98 0.99 1.00
##
## $log_BFF_max_RMSE
##      t
## -0.04178022
##
## $max_RMSE
## [1] 0.01

```

```
t_test_BFF(t_stat = t_score_two, df = t_df_two, one_sample = FALSE, n1 = 100, n2 = 100, save = FALSE, ...)
```



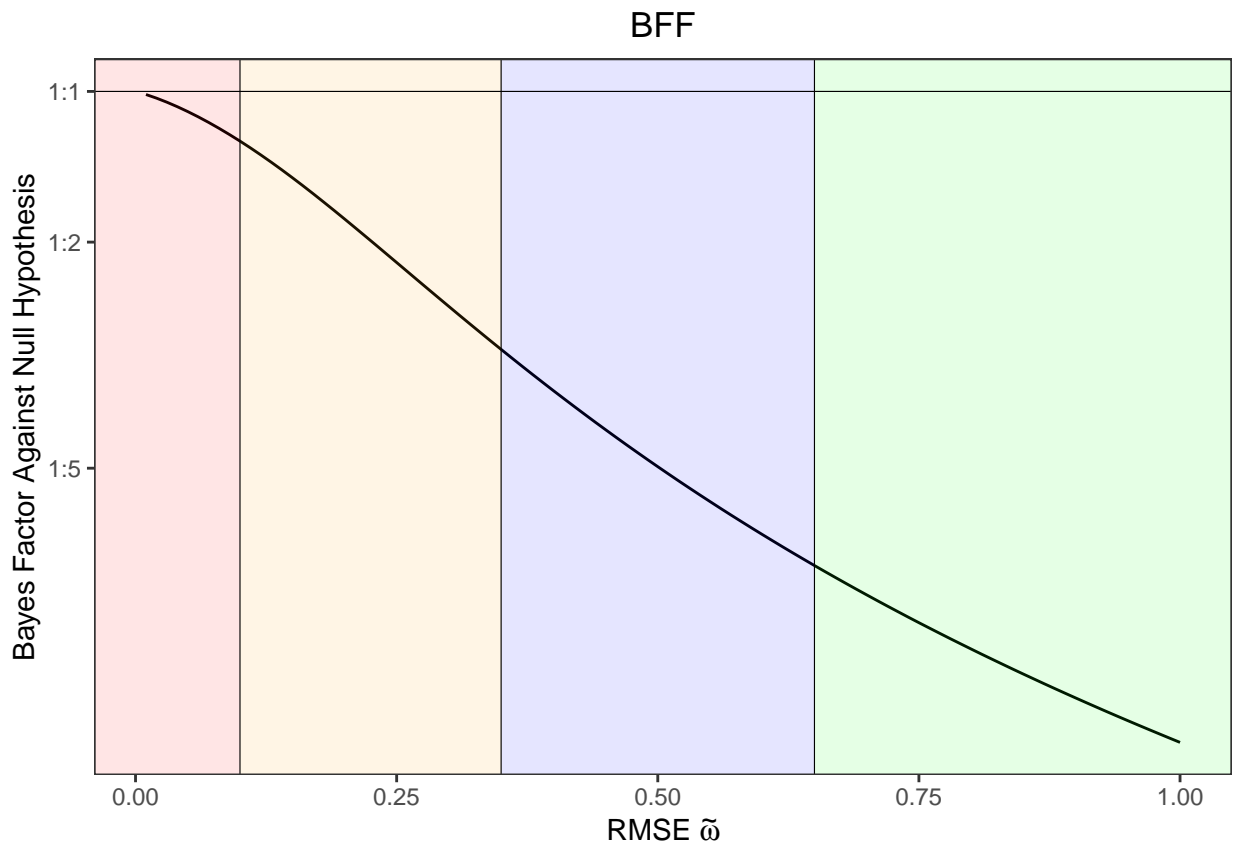
```
## $log_BFF
##      t          t          t          t          t          t
## -0.08556635 -0.17632389 -0.27192321 -0.37199136 -0.47613836 -0.58396386
##      t          t          t          t          t          t
## -0.69506346 -0.80903463 -0.92548203 -1.04402213 -1.16428706 -1.28592770
##      t          t          t          t          t          t
## -1.40861593 -1.53204624 -1.65593664 -1.78002902 -1.90408901 -2.02790542
##      t          t          t          t          t          t
## -2.15128946 -2.27407357 -2.39611030 -2.51727085 -2.63744373 -2.75653336
##      t          t          t          t          t          t
## -2.87445863 -2.99115158 -3.10655607 -3.22062663 -3.33332724 -3.44463031
##      t          t          t          t          t          t
## -3.55451573 -3.66296992 -3.76998508 -3.87555842 -3.97969153 -4.08238977
##      t          t          t          t          t          t
## -4.18366174 -4.28351882 -4.38197476 -4.47904527 -4.57474776 -4.66910097
##      t          t          t          t          t          t
## -4.76212477 -4.85383995 -4.94426796 -5.03343082 -5.12135088 -5.20805080
##      t          t          t          t          t          t
## -5.29355334 -5.37788132 -5.46105753 -5.54310465 -5.62404518 -5.70390143
##      t          t          t          t          t          t
## -5.78269541 -5.86044888 -5.93718323 -6.01291953 -6.08767848 -6.16148039
##      t          t          t          t          t          t
## -6.23434517 -6.30629233 -6.37734098 -6.44750980 -6.51681708 -6.58528067
##      t          t          t          t          t          t
## -6.65291803 -6.71974619 -6.78578180 -6.85104110 -6.91553992 -6.97929372
##      t          t          t          t          t          t
## -7.04231758 -7.10462619 -7.16623390 -7.22715468 -7.28740216 -7.34698962
```

```

##          t          t          t          t          t          t          t
## -7.40593000 -7.46423593 -7.52191972 -7.57899335 -7.63546852 -7.69135663
##          t          t          t          t          t          t          t
## -7.74666879 -7.80141583 -7.85560832 -7.90925654 -7.96237055 -8.01496012
##          t          t          t          t          t          t          t
## -8.06703482 -8.11860396 -8.16967662 -8.22026167 -8.27036774 -8.32000328
##          t          t          t          t
## -8.36917653 -8.41789551 -8.46616806 -8.51400185
##
## $effect_size
## [1] 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10 0.11 0.12 0.13 0.14 0.15
## [16] 0.16 0.17 0.18 0.19 0.20 0.21 0.22 0.23 0.24 0.25 0.26 0.27 0.28 0.29 0.30
## [31] 0.31 0.32 0.33 0.34 0.35 0.36 0.37 0.38 0.39 0.40 0.41 0.42 0.43 0.44 0.45
## [46] 0.46 0.47 0.48 0.49 0.50 0.51 0.52 0.53 0.54 0.55 0.56 0.57 0.58 0.59 0.60
## [61] 0.61 0.62 0.63 0.64 0.65 0.66 0.67 0.68 0.69 0.70 0.71 0.72 0.73 0.74 0.75
## [76] 0.76 0.77 0.78 0.79 0.80 0.81 0.82 0.83 0.84 0.85 0.86 0.87 0.88 0.89 0.90
## [91] 0.91 0.92 0.93 0.94 0.95 0.96 0.97 0.98 0.99 1.00
##
## $log_BFF_max_RMSE
##          t
## -0.08556635
##
## $max_RMSE
## [1] 0.01

```

```
t_test_BFF(t_stat = t_score_one, df = t_df_one, n = 100, save = FALSE, r = 2.5) #one sample t-test, con
```

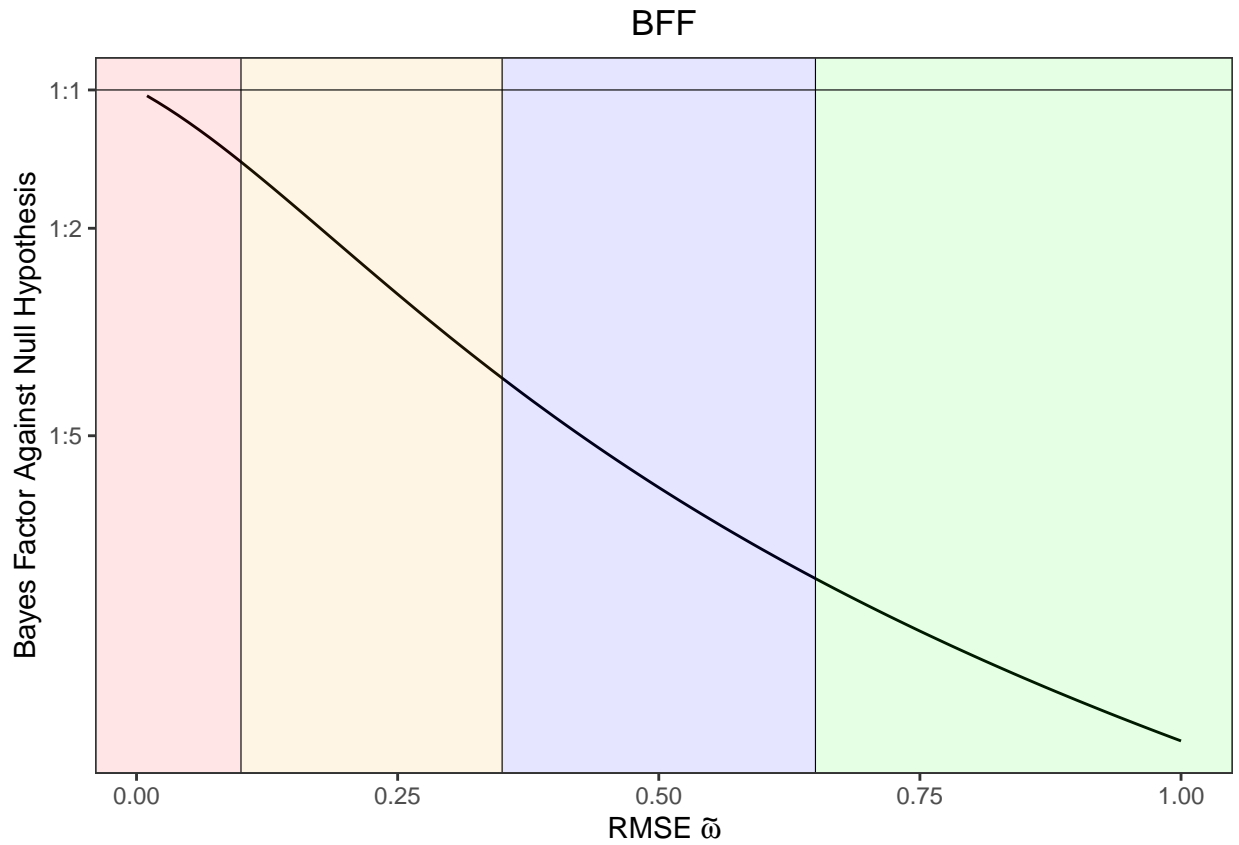


```

## $log_BFF
##      t      t      t      t      t      t
## -0.04119110 -0.08905598 -0.14306343 -0.20272289 -0.26760217 -0.33733464
##      t      t      t      t      t      t
## -0.41161635 -0.49019550 -0.57285716 -0.65940693 -0.74965592 -0.84340925
##      t      t      t      t      t      t
## -0.94045855 -1.04057852 -1.14352699 -1.24904738 -1.35687282 -1.46673094
##      t      t      t      t      t      t
## -1.57834883 -1.69145755 -1.80579615 -1.92111476 -2.03717708 -2.15376199
##      t      t      t      t      t      t
## -2.27066463 -2.38769681 -2.50468706 -2.62148032 -2.73793729 -2.85393375
##      t      t      t      t      t      t
## -2.96935955 -3.08411777 -3.19812363 -3.31130354 -3.42359412 -3.53494126
##      t      t      t      t      t      t
## -3.64529923 -3.75462986 -3.86290176 -3.97008959 -4.07617343 -4.18113816
##      t      t      t      t      t      t
## -4.28497290 -4.38767056 -4.48922736 -4.58964242 -4.68891744 -4.78705632
##      t      t      t      t      t      t
## -4.88406491 -4.97995074 -5.07472279 -5.16839125 -5.26096740 -5.35246339
##      t      t      t      t      t      t
## -5.44289214 -5.53226717 -5.62060250 -5.70791258 -5.79421216 -5.87951622
##      t      t      t      t      t      t
## -5.96383994 -6.04719857 -6.12960746 -6.21108193 -6.29163730 -6.37128881
##      t      t      t      t      t      t
## -6.45005162 -6.52794077 -6.60497113 -6.68115744 -6.75651425 -6.83105592
##      t      t      t      t      t      t
## -6.90479660 -6.97775025 -7.04993059 -7.12135112 -7.19202510 -7.26196559
##      t      t      t      t      t      t
## -7.33118539 -7.39969705 -7.46751291 -7.53464507 -7.60110538 -7.66690547
##      t      t      t      t      t      t
## -7.73205671 -7.79657029 -7.86045711 -7.92372790 -7.98639313 -8.04846308
##      t      t      t      t      t      t
## -8.10994778 -8.17085710 -8.23120064 -8.29098785 -8.35022795 -8.40892997
##      t      t      t      t      t
## -8.46710276 -8.52475496 -8.58189504 -8.63853130
##
## $effect_size
## [1] 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10 0.11 0.12 0.13 0.14 0.15
## [16] 0.16 0.17 0.18 0.19 0.20 0.21 0.22 0.23 0.24 0.25 0.26 0.27 0.28 0.29 0.30
## [31] 0.31 0.32 0.33 0.34 0.35 0.36 0.37 0.38 0.39 0.40 0.41 0.42 0.43 0.44 0.45
## [46] 0.46 0.47 0.48 0.49 0.50 0.51 0.52 0.53 0.54 0.55 0.56 0.57 0.58 0.59 0.60
## [61] 0.61 0.62 0.63 0.64 0.65 0.66 0.67 0.68 0.69 0.70 0.71 0.72 0.73 0.74 0.75
## [76] 0.76 0.77 0.78 0.79 0.80 0.81 0.82 0.83 0.84 0.85 0.86 0.87 0.88 0.89 0.90
## [91] 0.91 0.92 0.93 0.94 0.95 0.96 0.97 0.98 0.99 1.00
##
## $log_BFF_max_RMSE
##      t
## -0.0411911
##
## $max_RMSE
## [1] 0.01

```

```
t_test_BFF(t_stat = t_score_two, df = t_df_two, one_sample = FALSE, n1 = 100, n2 = 100, save = FALSE, ...)
```

```
## $log_BFF
##      t          t          t          t          t          t
## -0.08451573 -0.17417728 -0.26870573 -0.36780125 -0.47114744 -0.57841577
##      t          t          t          t          t          t
## -0.68927004 -0.80337058 -0.92037830 -1.03995831 -1.16178315 -1.28553562
##      t          t          t          t          t          t
## -1.41091107 -1.53761927 -1.66538584 -1.79395321 -1.92308124 -2.05254751
##      t          t          t          t          t          t
## -2.18214724 -2.31169308 -2.44101462 -2.56995775 -2.69838389 -2.82616924
##      t          t          t          t          t          t
## -2.95320379 -3.07939047 -3.20464420 -3.32889098 -3.45206697 -3.57411765
##      t          t          t          t          t          t
## -3.69499698 -3.81466662 -3.93309519 -4.05025756 -4.16613426 -4.28071086
##      t          t          t          t          t          t
## -4.39397741 -4.50592796 -4.61656014 -4.72587466 -4.83387503 -4.94056714
##      t          t          t          t          t          t
## -5.04595901 -5.15006047 -5.25288295 -5.35443923 -5.45474323 -5.55380987
##      t          t          t          t          t          t
## -5.65165487 -5.74829465 -5.84374614 -5.93802674 -6.03115416 -6.12314637
##      t          t          t          t          t          t
## -6.21402152 -6.30379784 -6.39249362 -6.48012712 -6.56671657 -6.65228008
##      t          t          t          t          t          t
## -6.73683564 -6.82040108 -6.90299404 -6.98463194 -7.06533200 -7.14511119
##      t          t          t          t          t          t
## -7.22398621 -7.30197351 -7.37908926 -7.45534937 -7.53076944 -7.60536479
##      t          t          t          t          t          t
## -7.67915046 -7.75214120 -7.82435145 -7.89579538 -7.96648687 -8.03643949
```

```

##           t           t           t           t           t           t           t
## -8.10566657 -8.17418112 -8.24199588 -8.30912334 -8.37557570 -8.44136490
##           t           t           t           t           t           t           t
## -8.50650262 -8.57100028 -8.63486906 -8.69811989 -8.76076345 -8.82281020
##           t           t           t           t           t           t           t
## -8.88427035 -8.94515390 -9.00547063 -9.06523008 -9.12444162 -9.18311437
##           t           t           t           t
## -9.24125727 -9.29887908 -9.35598833 -9.41259340
##
## $effect_size
## [1] 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10 0.11 0.12 0.13 0.14 0.15
## [16] 0.16 0.17 0.18 0.19 0.20 0.21 0.22 0.23 0.24 0.25 0.26 0.27 0.28 0.29 0.30
## [31] 0.31 0.32 0.33 0.34 0.35 0.36 0.37 0.38 0.39 0.40 0.41 0.42 0.43 0.44 0.45
## [46] 0.46 0.47 0.48 0.49 0.50 0.51 0.52 0.53 0.54 0.55 0.56 0.57 0.58 0.59 0.60
## [61] 0.61 0.62 0.63 0.64 0.65 0.66 0.67 0.68 0.69 0.70 0.71 0.72 0.73 0.74 0.75
## [76] 0.76 0.77 0.78 0.79 0.80 0.81 0.82 0.83 0.84 0.85 0.86 0.87 0.88 0.89 0.90
## [91] 0.91 0.92 0.93 0.94 0.95 0.96 0.97 0.98 0.99 1.00
##
## $log_BFF_max_RMSE
##           t
## -0.08451573
##
## $max_RMSE
## [1] 0.01

```

chi² - test

```

# generate some data
x <- matrix(c(12, 5, 7, 7), ncol = 2)

# calculating chi2 test statistic from chisq.test
chi2_stat = chisq.test(x)$statistic

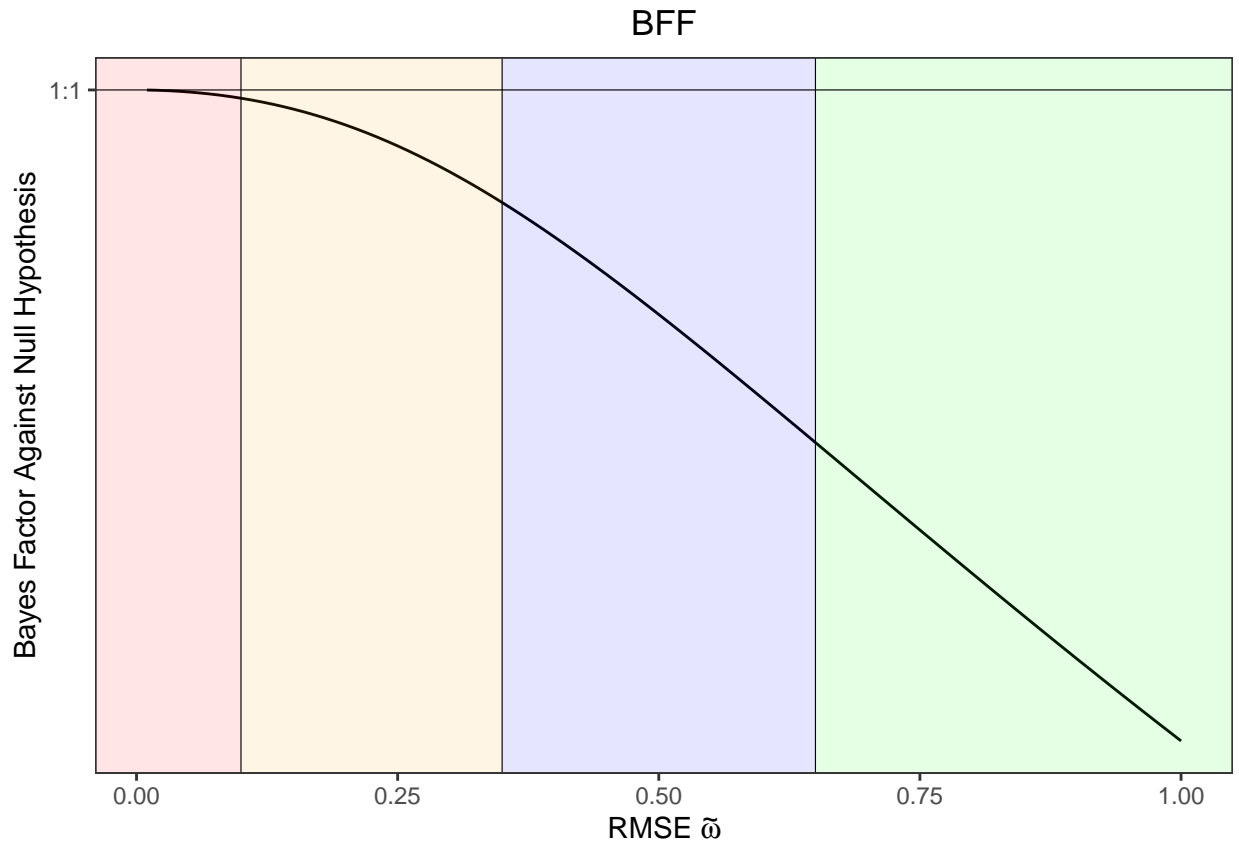
```

Calculating BFF using chi2_test_BFF

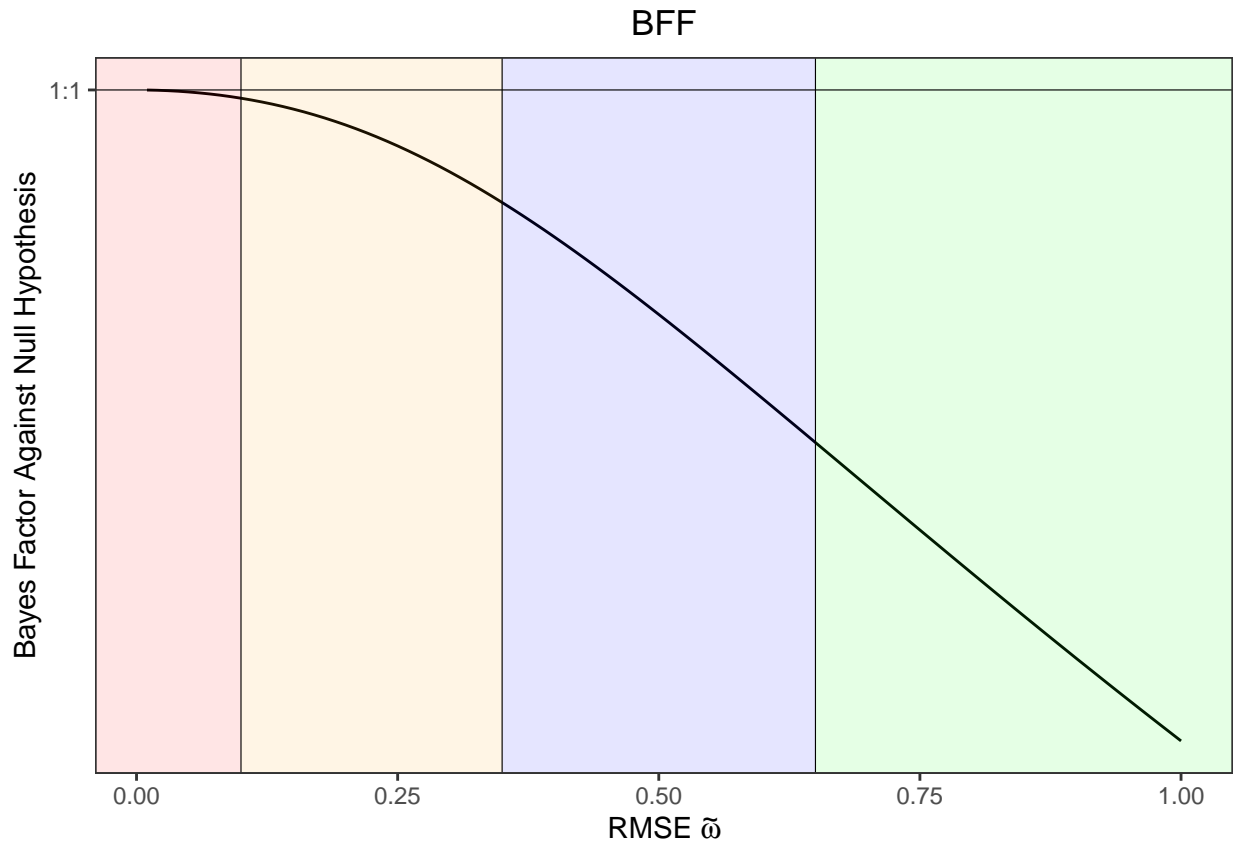
```

# default r and tau2
chi2_BFF_pear = chi2_test_BFF(chi2_stat = chi2_stat, df = 1, n = 4, save = FALSE) #Pearson's chi2 test

```



```
chi2_BFF_lrt = chi2_test_BFF(chi2_stat = chi2_stat, df = 1, n = 4, save = FALSE, pearsons = FALSE) #Lik
```



```
# default r and user specified tau2
# single tau2
chi2_test_BFF(chi2_stat = chi2_stat, df = 1, n = 4, save = FALSE, tau2 = 0.5) #Pearson's chi2 test
```

```
## $BFF
## X-squared
## -0.3076652
##
## $tau2
## [1] 0.5
```

```
chi2_test_BFF(chi2_stat = chi2_stat, df = 1, n = 4, save = FALSE, pears = FALSE, tau2 = 0.5) #Likeli
```

```
## $BFF
## X-squared
## -0.3076652
##
## $tau2
## [1] 0.5
```

```
# vector of tau2 values
chi2_test_BFF(chi2_stat = chi2_stat, df = 1, n = 4, save = FALSE, tau2 = c(0.5, 0.8)) #Pearson's chi2 t
```

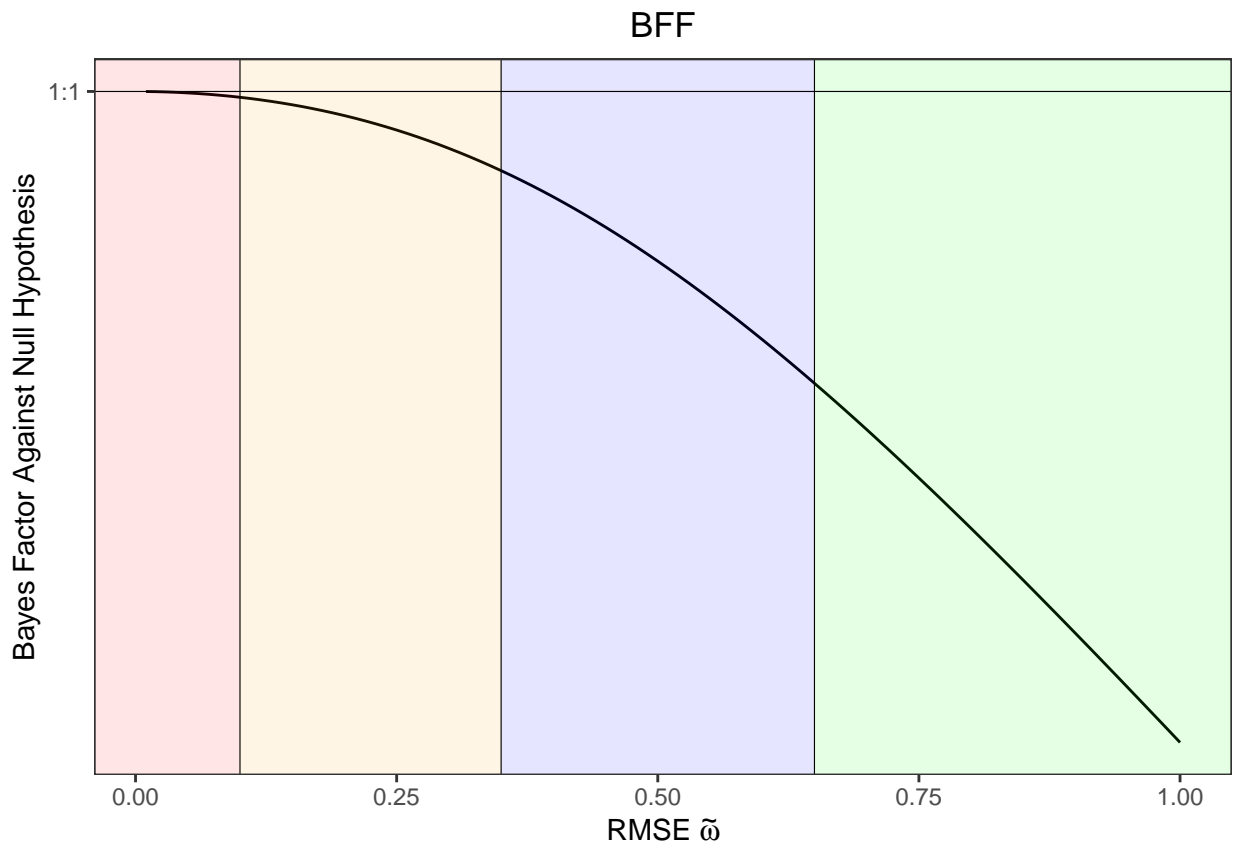
```
## $BFF
## X-squared X-squared
```

```
## -0.3076652 -0.4884950
##
## $tau2
## [1] 0.5 0.8
```

```
chi2_test_BFF(chi2_stat = chi2_stat, df = 1, n = 4, save = FALSE, pearsons = FALSE, tau2 = c(0.5, 0.8))
```

```
## $BFF
## X-squared X-squared
## -0.3076652 -0.4884950
##
## $tau2
## [1] 0.5 0.8
```

```
# user specified r and default tau2
chi2_test_BFF(chi2_stat = chi2_stat, df = 1, n = 4, save = FALSE, r = 2) #Pearson's chi2 test, integer
```



```
## $log_BFF
## [1] -0.0001196450 -0.0004788011 -0.0010781291 -0.0019187229 -0.0030020981
## [6] -0.0043301769 -0.0059052683 -0.0077300452 -0.0098075173 -0.0121410018
## [11] -0.0147340907 -0.0175906158 -0.0207146126 -0.0241102819 -0.0277819510
## [16] -0.0317340340 -0.0359709929 -0.0404972975 -0.0453173876 -0.0504356353
## [21] -0.0558563092 -0.0615835399 -0.0676212878 -0.0739733132 -0.0806431479
## [26] -0.0876340706 -0.0949490839 -0.1025908942 -0.1105618943 -0.1188641489
## [31] -0.1274993825 -0.1364689699 -0.1457739293 -0.1554149179 -0.1653922294
```

```

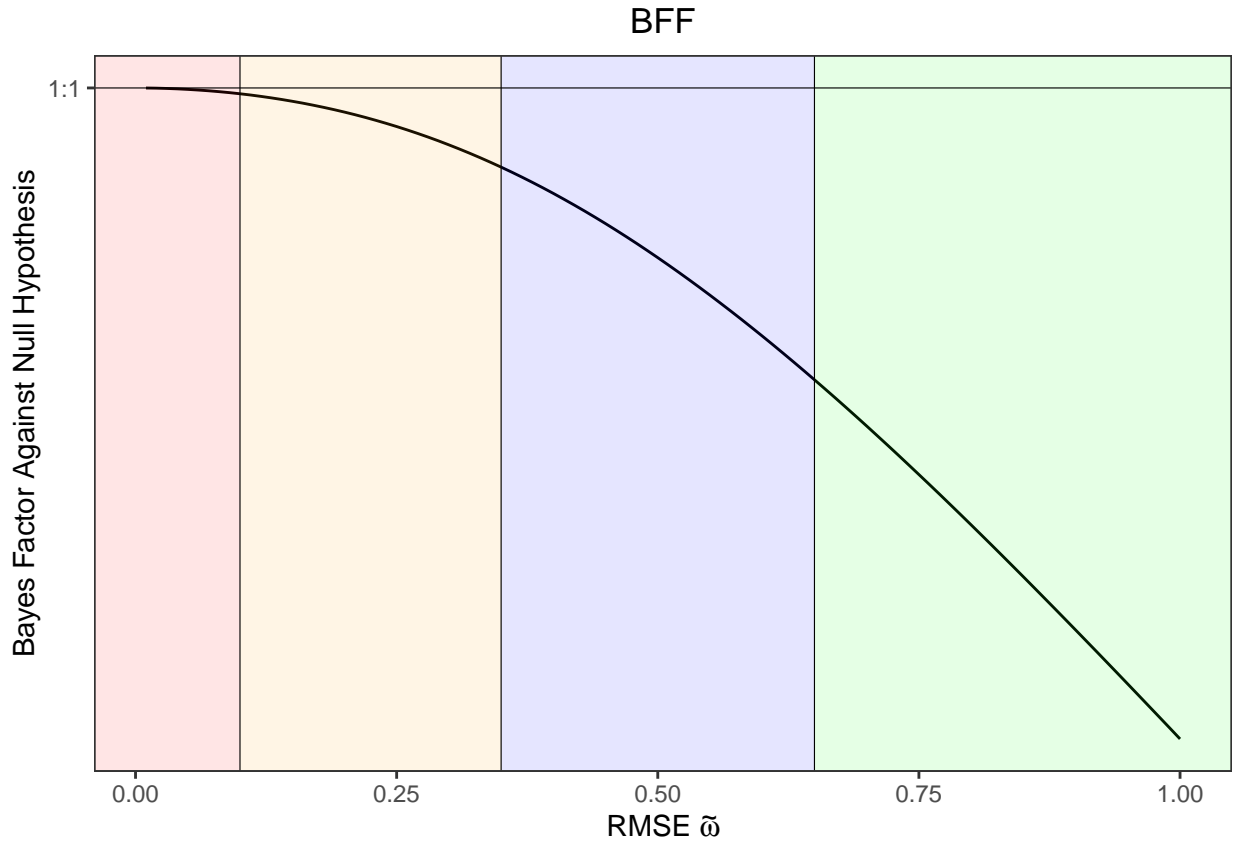
## [36] -0.1757057944 -0.1863551819 -0.1973396033 -0.2086579185 -0.2203086421
## [41] -0.2322899529 -0.2445997032 -0.2572354298 -0.2701943662 -0.2834734550
## [46] -0.2970693613 -0.3109784868 -0.3251969842 -0.3397207715 -0.3545455472
## [51] -0.3696668052 -0.3850798498 -0.4007798104 -0.4167616563 -0.4330202117
## [56] -0.4495501691 -0.4663461042 -0.4834024889 -0.5007137045 -0.5182740548
## [61] -0.5360777781 -0.5541190591 -0.5723920402 -0.5908908323 -0.6096095253
## [66] -0.6285421975 -0.6476829252 -0.6670257910 -0.6865648928 -0.7062943507
## [71] -0.7262083145 -0.7463009709 -0.7665665490 -0.7869993268 -0.8075936359
## [76] -0.8283438671 -0.8492444744 -0.8702899796 -0.8914749754 -0.9127941296
## [81] -0.9342421872 -0.9558139738 -0.9775043980 -0.9993084528 -1.0212212181
## [86] -1.0432378619 -1.0653536417 -1.0875639055 -1.1098640927 -1.1322497345
## [91] -1.1547164547 -1.1772599694 -1.1998760878 -1.2225607115 -1.2453098345
## [96] -1.2681195429 -1.2909860143 -1.3139055175 -1.3368744113 -1.3598891440
##
## $effect_size
## [1] 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10 0.11 0.12 0.13 0.14 0.15
## [16] 0.16 0.17 0.18 0.19 0.20 0.21 0.22 0.23 0.24 0.25 0.26 0.27 0.28 0.29 0.30
## [31] 0.31 0.32 0.33 0.34 0.35 0.36 0.37 0.38 0.39 0.40 0.41 0.42 0.43 0.44 0.45
## [46] 0.46 0.47 0.48 0.49 0.50 0.51 0.52 0.53 0.54 0.55 0.56 0.57 0.58 0.59 0.60
## [61] 0.61 0.62 0.63 0.64 0.65 0.66 0.67 0.68 0.69 0.70 0.71 0.72 0.73 0.74 0.75
## [76] 0.76 0.77 0.78 0.79 0.80 0.81 0.82 0.83 0.84 0.85 0.86 0.87 0.88 0.89 0.90
## [91] 0.91 0.92 0.93 0.94 0.95 0.96 0.97 0.98 0.99 1.00
##
## $log_BFF_max_RMSE
## [1] -0.000119645
##
## $max_RMSE
## [1] 0.01

```

```

chi2_test_BFF(chi2_stat = chi2_stat, df = 1, n = 4, save = FALSE, pearsons = FALSE, r = 2) #Likelihood

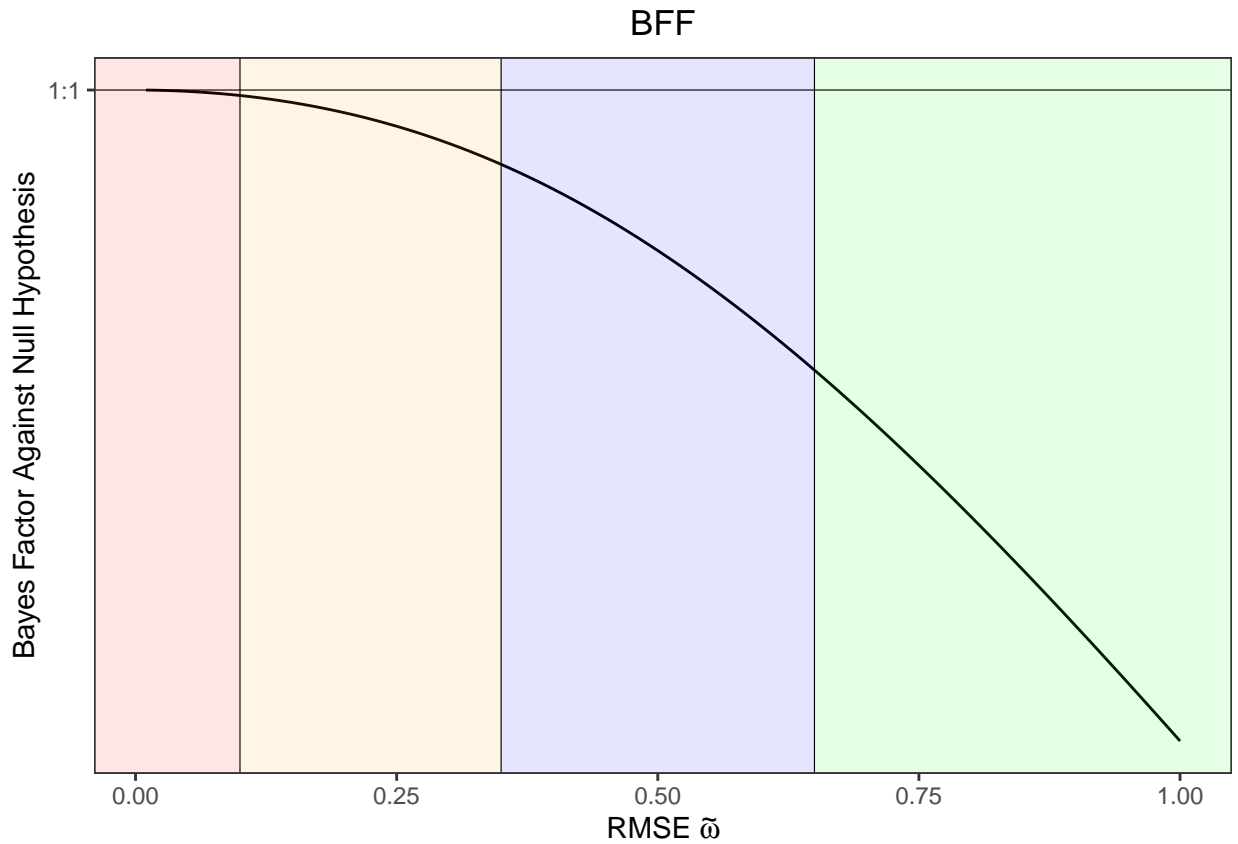
```



```
## $log_BFF
## [1] -0.0001196450 -0.0004788011 -0.0010781291 -0.0019187229 -0.0030020981
## [6] -0.0043301769 -0.0059052683 -0.0077300452 -0.0098075173 -0.0121410018
## [11] -0.0147340907 -0.0175906158 -0.0207146126 -0.0241102819 -0.0277819510
## [16] -0.0317340340 -0.0359709929 -0.0404972975 -0.0453173876 -0.0504356353
## [21] -0.0558563092 -0.0615835399 -0.0676212878 -0.0739733132 -0.0806431479
## [26] -0.0876340706 -0.0949490839 -0.1025908942 -0.1105618943 -0.1188641489
## [31] -0.1274993825 -0.1364689699 -0.1457739293 -0.1554149179 -0.1653922294
## [36] -0.1757057944 -0.1863551819 -0.1973396033 -0.2086579185 -0.2203086421
## [41] -0.2322899529 -0.2445997032 -0.2572354298 -0.2701943662 -0.2834734550
## [46] -0.2970693613 -0.3109784868 -0.3251969842 -0.3397207715 -0.3545455472
## [51] -0.3696668052 -0.3850798498 -0.4007798104 -0.4167616563 -0.4330202117
## [56] -0.4495501691 -0.4663461042 -0.4834024889 -0.5007137045 -0.5182740548
## [61] -0.5360777781 -0.5541190591 -0.5723920402 -0.5908908323 -0.6096095253
## [66] -0.6285421975 -0.6476829252 -0.6670257910 -0.6865648928 -0.7062943507
## [71] -0.7262083145 -0.7463009709 -0.7665665490 -0.7869993268 -0.8075936359
## [76] -0.8283438671 -0.8492444744 -0.8702899796 -0.8914749754 -0.9127941296
## [81] -0.9342421872 -0.9558139738 -0.9775043980 -0.9993084528 -1.0212212181
## [86] -1.0432378619 -1.0653536417 -1.0875639055 -1.1098640927 -1.1322497345
## [91] -1.1547164547 -1.1772599694 -1.1998760878 -1.2225607115 -1.2453098345
## [96] -1.2681195429 -1.2909860143 -1.3139055175 -1.3368744113 -1.3598891440
##
## $effect_size
## [1] 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10 0.11 0.12 0.13 0.14 0.15
## [16] 0.16 0.17 0.18 0.19 0.20 0.21 0.22 0.23 0.24 0.25 0.26 0.27 0.28 0.29 0.30
## [31] 0.31 0.32 0.33 0.34 0.35 0.36 0.37 0.38 0.39 0.40 0.41 0.42 0.43 0.44 0.45
## [46] 0.46 0.47 0.48 0.49 0.50 0.51 0.52 0.53 0.54 0.55 0.56 0.57 0.58 0.59 0.60
```

```
## [61] 0.61 0.62 0.63 0.64 0.65 0.66 0.67 0.68 0.69 0.70 0.71 0.72 0.73 0.74 0.75
## [76] 0.76 0.77 0.78 0.79 0.80 0.81 0.82 0.83 0.84 0.85 0.86 0.87 0.88 0.89 0.90
## [91] 0.91 0.92 0.93 0.94 0.95 0.96 0.97 0.98 0.99 1.00
##
## $log_BFF_max_RMSE
## [1] -0.000119645
##
## $max_RMSE
## [1] 0.01
```

```
chi2_test_BFF(chi2_stat = chi2_stat, df = 1, n = 4, save = FALSE, r = 2.5) #Pearson's chi2 test, contin
```



```
## $log_BFF
## [1] -0.0001076784 -0.0004308876 -0.0009701477 -0.0017263211 -0.0027006051
## [6] -0.0038945228 -0.0053099100 -0.0069489013 -0.0088139126 -0.0109076224
## [11] -0.0132329507 -0.0157930363 -0.0185912131 -0.0216309847 -0.0249159984
## [16] -0.0284500184 -0.0322368985 -0.0362805553 -0.0405849401 -0.0451540126
## [21] -0.0499917139 -0.0551019410 -0.0604885221 -0.0661551920 -0.0721055701
## [26] -0.0783431389 -0.0848712236 -0.0916929743 -0.0988113484 -0.1062290959
## [31] -0.1139487453 -0.1219725918 -0.1303026867 -0.1389408290 -0.1478885576
## [36] -0.1571471463 -0.1667175996 -0.1766006493 -0.1867967542 -0.1973060993
## [41] -0.2081285973 -0.2192638909 -0.2307113559 -0.2424701061 -0.2545389979
## [46] -0.2669166369 -0.2796013839 -0.2925913629 -0.3058844690 -0.3194783761
## [51] -0.3333705466 -0.3475582397 -0.3620385214 -0.3768082739 -0.3918642051
## [56] -0.4072028587 -0.4228206241 -0.4387137461 -0.4548783347 -0.4713103752
## [61] -0.4880057373 -0.5049601850 -0.5221693858 -0.5396289195 -0.5573342875
```



```

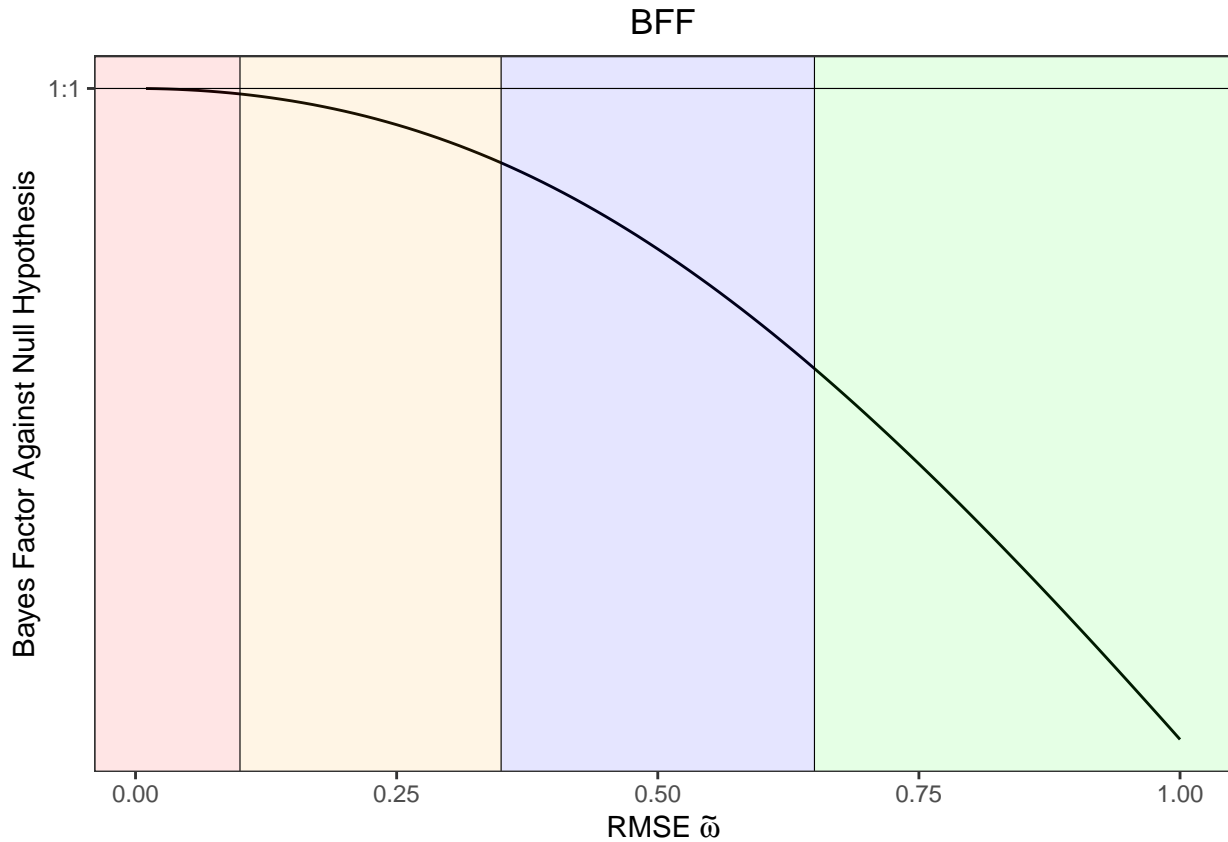
## [66] -0.5752809213 -0.5934641908 -0.6118794123 -0.6305218567 -0.6493867568
## [71] -0.6684693145 -0.6877647079 -0.7072680979 -0.7269746348 -0.7468794637
## [76] -0.7669777312 -0.7872645899 -0.8077352044 -0.8283847557 -0.8492084457
## [81] -0.8702015021 -0.8913591820 -0.9126767756 -0.9341496101 -0.9557730530
## [86] -0.9775425145 -0.9994534513 -1.0215013685 -1.0436818221 -1.0659904213
## [91] -1.0884228305 -1.1109747711 -1.1336420228 -1.1564204255 -1.1793058803
## [96] -1.2022943507 -1.2253818634 -1.2485645095 -1.2718384449 -1.2951998907
##
## $effect_size
## [1] 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10 0.11 0.12 0.13 0.14 0.15
## [16] 0.16 0.17 0.18 0.19 0.20 0.21 0.22 0.23 0.24 0.25 0.26 0.27 0.28 0.29 0.30
## [31] 0.31 0.32 0.33 0.34 0.35 0.36 0.37 0.38 0.39 0.40 0.41 0.42 0.43 0.44 0.45
## [46] 0.46 0.47 0.48 0.49 0.50 0.51 0.52 0.53 0.54 0.55 0.56 0.57 0.58 0.59 0.60
## [61] 0.61 0.62 0.63 0.64 0.65 0.66 0.67 0.68 0.69 0.70 0.71 0.72 0.73 0.74 0.75
## [76] 0.76 0.77 0.78 0.79 0.80 0.81 0.82 0.83 0.84 0.85 0.86 0.87 0.88 0.89 0.90
## [91] 0.91 0.92 0.93 0.94 0.95 0.96 0.97 0.98 0.99 1.00
##
## $log_BFF_max_RMSE
## [1] -0.0001076784
##
## $max_RMSE
## [1] 0.01

```

```

chi2_test_BFF(chi2_stat = chi2_stat, df = 1, n = 4, save = FALSE, pearsons = FALSE, r = 2.5) #Likelihood

```



```

## $log_BFF

```

```

## [1] -0.0001076784 -0.0004308876 -0.0009701477 -0.0017263211 -0.0027006051
## [6] -0.0038945228 -0.0053099100 -0.0069489013 -0.0088139126 -0.0109076224
## [11] -0.0132329507 -0.0157930363 -0.0185912131 -0.0216309847 -0.0249159984
## [16] -0.0284500184 -0.0322368985 -0.0362805553 -0.0405849401 -0.0451540126
## [21] -0.0499917139 -0.0551019410 -0.0604885221 -0.0661551920 -0.0721055701
## [26] -0.0783431389 -0.0848712236 -0.0916929743 -0.0988113484 -0.1062290959
## [31] -0.1139487453 -0.1219725918 -0.1303026867 -0.1389408290 -0.1478885576
## [36] -0.1571471463 -0.1667175996 -0.1766006493 -0.1867967542 -0.1973060993
## [41] -0.2081285973 -0.2192638909 -0.2307113559 -0.2424701061 -0.2545389979
## [46] -0.2669166369 -0.2796013839 -0.2925913629 -0.3058844690 -0.3194783761
## [51] -0.3333705466 -0.3475582397 -0.3620385214 -0.3768082739 -0.3918642051
## [56] -0.4072028587 -0.4228206241 -0.4387137461 -0.4548783347 -0.4713103752
## [61] -0.4880057373 -0.5049601850 -0.5221693858 -0.5396289195 -0.5573342875
## [66] -0.5752809213 -0.5934641908 -0.6118794123 -0.6305218567 -0.6493867568
## [71] -0.6684693145 -0.6877647079 -0.7072680979 -0.7269746348 -0.7468794637
## [76] -0.7669777312 -0.7872645899 -0.8077352044 -0.8283847557 -0.8492084457
## [81] -0.8702015021 -0.8913591820 -0.9126767756 -0.9341496101 -0.9557730530
## [86] -0.9775425145 -0.9994534513 -1.0215013685 -1.0436818221 -1.0659904213
## [91] -1.0884228305 -1.1109747711 -1.1336420228 -1.1564204255 -1.1793058803
## [96] -1.2022943507 -1.2253818634 -1.2485645095 -1.2718384449 -1.2951998907
##
## $effect_size
## [1] 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10 0.11 0.12 0.13 0.14 0.15
## [16] 0.16 0.17 0.18 0.19 0.20 0.21 0.22 0.23 0.24 0.25 0.26 0.27 0.28 0.29 0.30
## [31] 0.31 0.32 0.33 0.34 0.35 0.36 0.37 0.38 0.39 0.40 0.41 0.42 0.43 0.44 0.45
## [46] 0.46 0.47 0.48 0.49 0.50 0.51 0.52 0.53 0.54 0.55 0.56 0.57 0.58 0.59 0.60
## [61] 0.61 0.62 0.63 0.64 0.65 0.66 0.67 0.68 0.69 0.70 0.71 0.72 0.73 0.74 0.75
## [76] 0.76 0.77 0.78 0.79 0.80 0.81 0.82 0.83 0.84 0.85 0.86 0.87 0.88 0.89 0.90
## [91] 0.91 0.92 0.93 0.94 0.95 0.96 0.97 0.98 0.99 1.00
##
## $log_BFF_max_RMSE
## [1] -0.0001076784
##
## $max_RMSE
## [1] 0.01

```

F - test

```

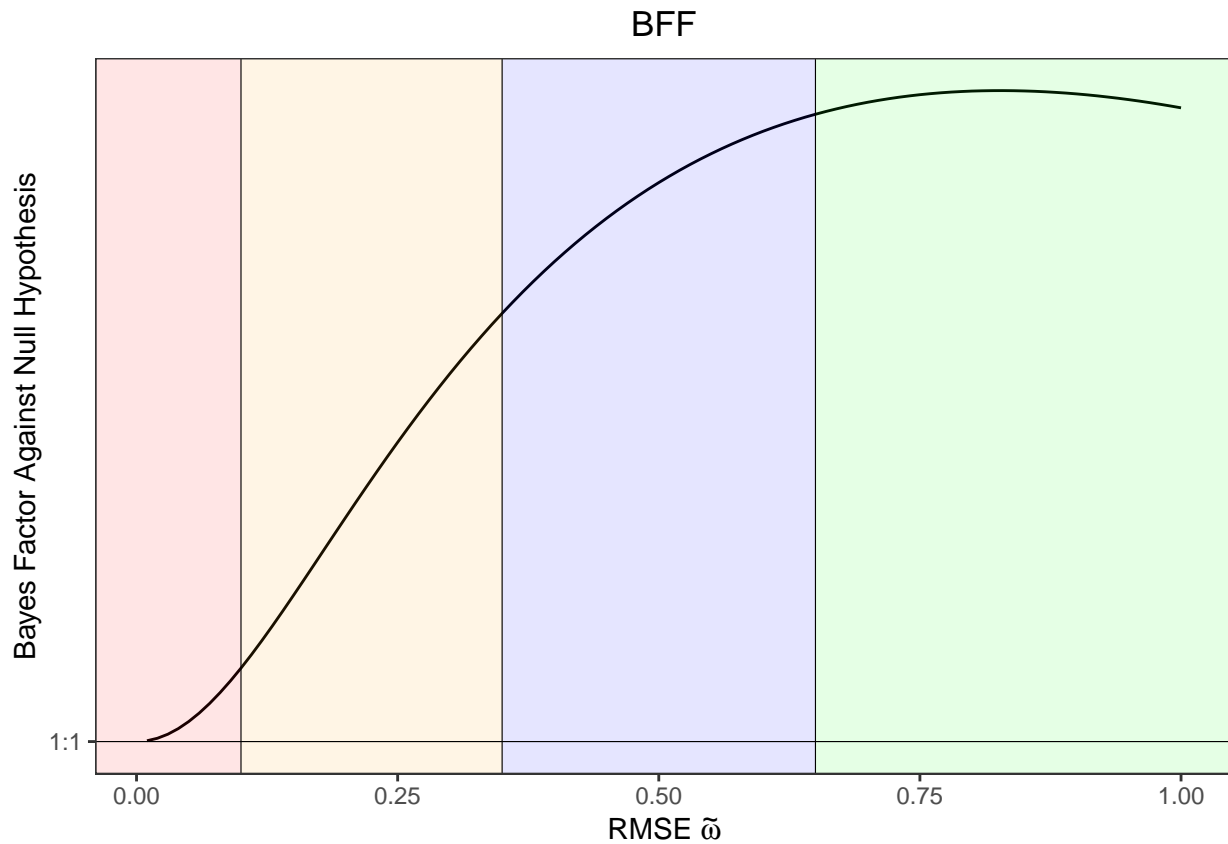
# generate some data
n = 100
p = 3
X = matrix(rnorm(n*p), nrow = n)
beta = c(1,1,0)
y = X %*% beta + rnorm(n)
model1 = lm(y ~ X)
anova_model = anova(model1)
F_stat = anova_model$`F value`[1]

```

Calculating BFF using `f_test_BFF`

```
# default r and tau2
```

```
F_BFF_one = f_test_BFF(f_stat = F_stat, df1 = anova_model$Df[1], df2 = anova_model$Df[2], n = n, save =
```



```
# default r and user specified tau2
```

```
# single tau2
```

```
f_test_BFF(f_stat = F_stat, df1 = anova_model$Df[1], df2 = anova_model$Df[2], n = n, tau2 = 0.5, save =
```

```
## $BFF
```

```
## [1] 1.670793
```

```
##
```

```
## $tau2
```

```
## [1] 0.5
```

```
# vector of tau2 values
```

```
f_test_BFF(f_stat = F_stat, df1 = anova_model$Df[1], df2 = anova_model$Df[2], n = n, tau2 = c(0.5, 0.8)
```

```
## $BFF
```

```
## [1] 1.670793 1.690308
```

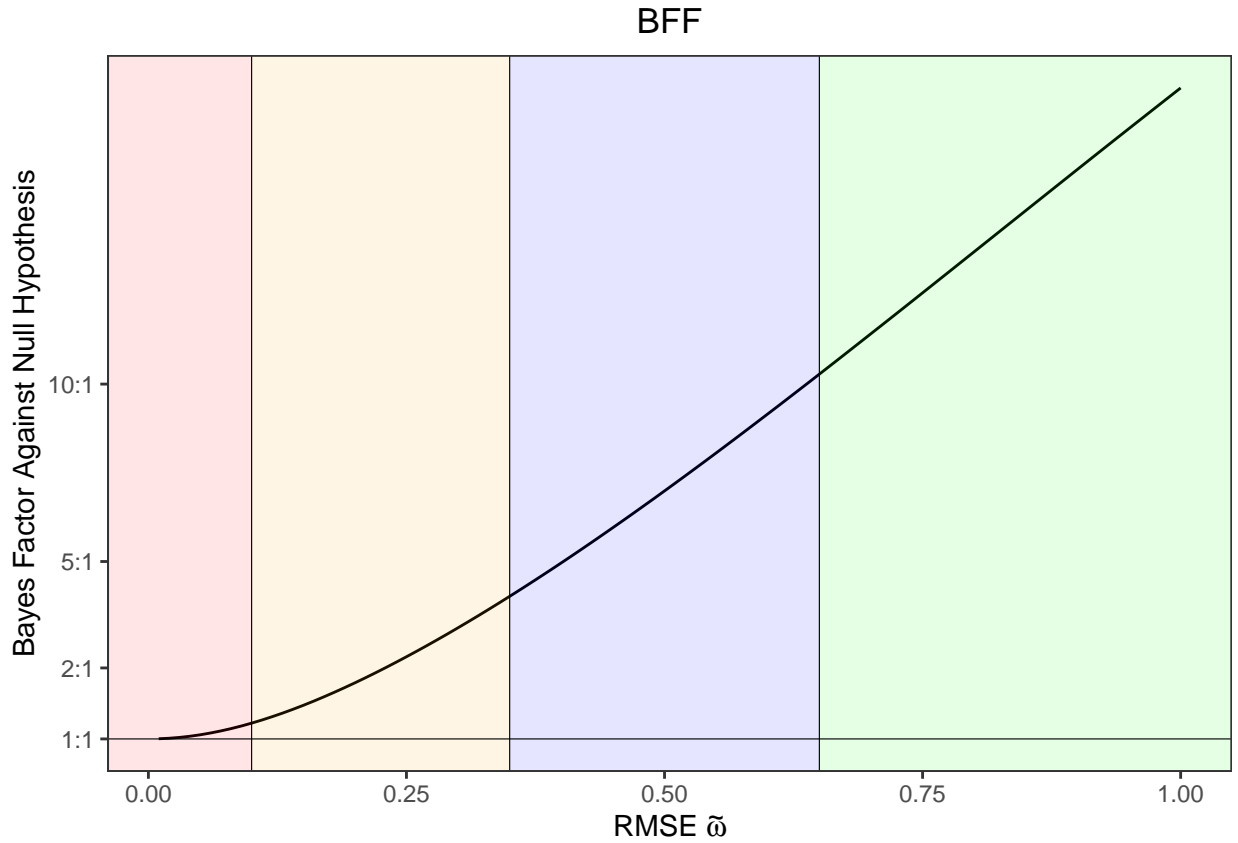
```
##
```

```
## $tau2
```

```
## [1] 0.5 0.8
```

```
# user specified r and default tau2
```

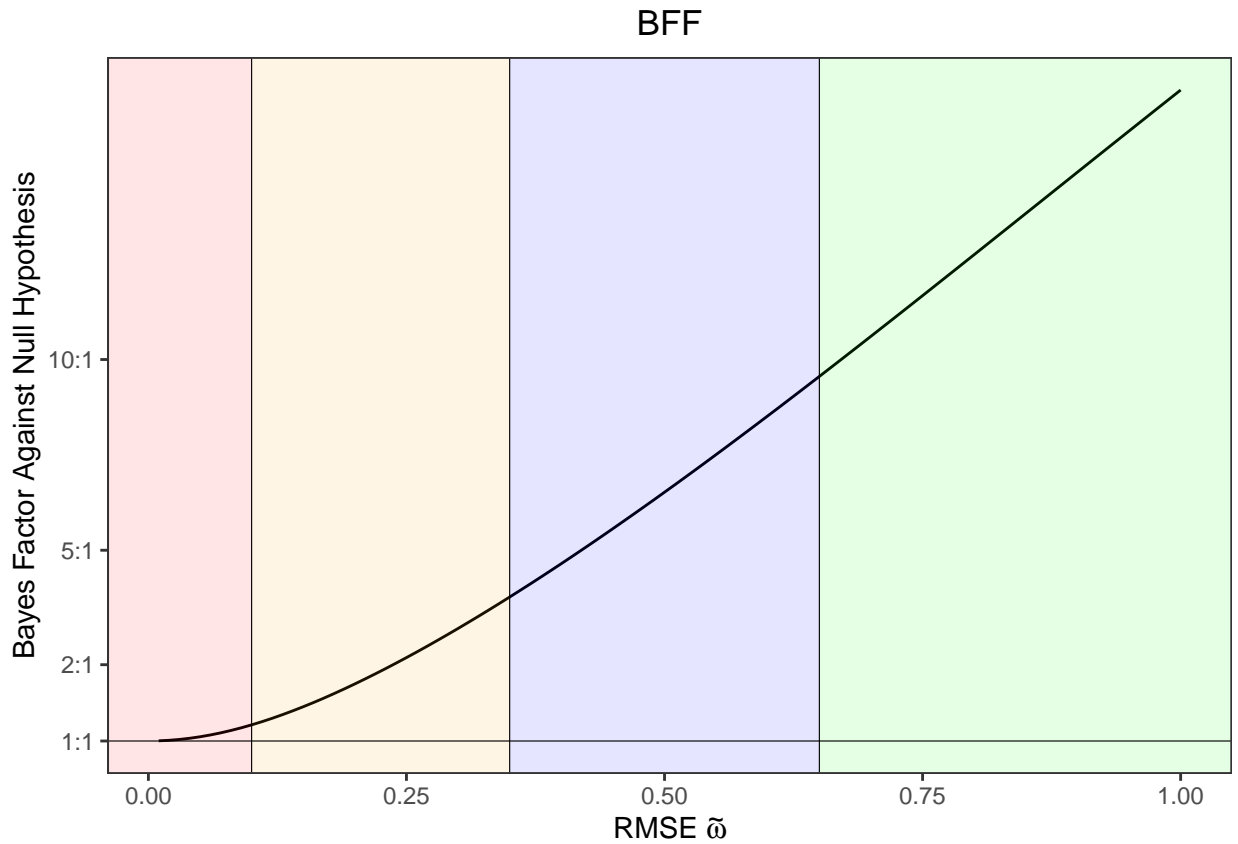
```
f_test_BFF(f_stat = F_stat, df1 = anova_model$Df[1], df2 = anova_model$Df[2], n = n, r = 2, save = FALSE)
```



```
## $log_BFF
## [1] 0.004693315 0.018739287 0.042037424 0.074424881 0.115682980
## [6] 0.165545520 0.223708214 0.289838569 0.363585571 0.444588677
## [11] 0.532485745 0.626919680 0.727543727 0.834025437 0.946049419
## [16] 1.063319024 1.185557157 1.312506381 1.443928493 1.579603715
## [21] 1.719329629 1.862919959 2.010203268 2.161021656 2.315229465
## [26] 2.472692057 2.633284658 2.796891290 2.963403792 3.132720939
## [31] 3.304747636 3.479394207 3.656575758 3.836211611 4.018224805
## [36] 4.202541651 4.389091350 4.577805650 4.768618546 4.961466023
## [41] 5.156285825 5.353017263 5.551601034 5.751979080 5.954094456
## [46] 6.157891218 6.363314330 6.570309579 6.778823510 6.988803363
## [51] 7.200197026 7.412952994 7.627020332 7.842348651 8.058888084
## [56] 8.276589269 8.495403336 8.715281896 8.936177039 9.158041324
## [61] 9.380827784 9.604489922 9.828981715 10.054257619 10.280272573
## [66] 10.506982003 10.734341831 10.962308483 11.190838892 11.419890511
## [71] 11.649421317 11.879389823 12.109755080 12.340476694 12.571514824
## [76] 12.802830195 13.034384106 13.266138434 13.498055640 13.730098778
## [81] 13.962231500 14.194418059 14.426623314 14.658812739 14.890952418
## [86] 15.123009059 15.354949985 15.586743147 15.818357118 16.049761099
## [91] 16.280924916 16.511819025 16.742414507 16.972683068 17.202597043
## [96] 17.432129388 17.661253681 17.889944121 18.118175522 18.345923311
##
## $effect_size
## [1] 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10 0.11 0.12 0.13 0.14 0.15
## [16] 0.16 0.17 0.18 0.19 0.20 0.21 0.22 0.23 0.24 0.25 0.26 0.27 0.28 0.29 0.30
## [31] 0.31 0.32 0.33 0.34 0.35 0.36 0.37 0.38 0.39 0.40 0.41 0.42 0.43 0.44 0.45
## [46] 0.46 0.47 0.48 0.49 0.50 0.51 0.52 0.53 0.54 0.55 0.56 0.57 0.58 0.59 0.60
```

```
## [61] 0.61 0.62 0.63 0.64 0.65 0.66 0.67 0.68 0.69 0.70 0.71 0.72 0.73 0.74 0.75
## [76] 0.76 0.77 0.78 0.79 0.80 0.81 0.82 0.83 0.84 0.85 0.86 0.87 0.88 0.89 0.90
## [91] 0.91 0.92 0.93 0.94 0.95 0.96 0.97 0.98 0.99 1.00
##
## $log_BFF_max_RMSE
## [1] 18.34592
##
## $max_RMSE
## [1] 1
```

```
f_test_BFF(f_stat = F_stat, df1 = anova_model$Df[1], df2 = anova_model$Df[2], n = n, r = 2.5, save = FA)
```



```
## $log_BFF
## [1] 0.004469748 0.017845717 0.040029480 0.070861483 0.110127379
## [6] 0.157566095 0.212879015 0.275739603 0.345802867 0.422714170
## [11] 0.506117016 0.595659615 0.691000138 0.791810672 0.897780006
## [16] 1.008615365 1.124043279 1.243809764 1.367679968 1.495437430
## [21] 1.626883083 1.761834091 1.900122605 2.041594495 2.186108100
## [26] 2.333533032 2.483749043 2.636644974 2.792117794 2.950071716
## [31] 3.110417406 3.273071263 3.437954788 3.604994003 3.774118951
## [36] 3.945263244 4.118363663 4.293359806 4.470193775 4.648809907
## [41] 4.829154525 5.011175726 5.194823198 5.380048046 5.566802655
## [46] 5.755040557 5.944716320 6.135785452 6.328204309 6.521930028
## [51] 6.716920453 6.913134084 7.110530024 7.309067936 7.508708009
## [56] 7.709410923 7.911137820 8.113850289 8.317510336 8.522080377
## [61] 8.727523219 8.933802051 9.140880436 9.348722304 9.557291945
```

```

## [66] 9.766554009 9.976473503 10.187015787 10.398146580 10.609831954
## [71] 10.822038339 11.034732527 11.247881670 11.461453287 11.675415264
## [76] 11.889735863 12.104383718 12.319327844 12.534537641 12.749982897
## [81] 12.965633789 13.181460893 13.397435181 13.613528029 13.829711221
## [86] 14.045956949 14.262237817 14.478526845 14.694797474 14.911023561
## [91] 15.127179390 15.343239669 15.559179530 15.774974537 15.990600681
## [96] 16.206034383 16.421252497 16.636232306 16.850951526 17.065388303
##
## $effect_size
## [1] 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10 0.11 0.12 0.13 0.14 0.15
## [16] 0.16 0.17 0.18 0.19 0.20 0.21 0.22 0.23 0.24 0.25 0.26 0.27 0.28 0.29 0.30
## [31] 0.31 0.32 0.33 0.34 0.35 0.36 0.37 0.38 0.39 0.40 0.41 0.42 0.43 0.44 0.45
## [46] 0.46 0.47 0.48 0.49 0.50 0.51 0.52 0.53 0.54 0.55 0.56 0.57 0.58 0.59 0.60
## [61] 0.61 0.62 0.63 0.64 0.65 0.66 0.67 0.68 0.69 0.70 0.71 0.72 0.73 0.74 0.75
## [76] 0.76 0.77 0.78 0.79 0.80 0.81 0.82 0.83 0.84 0.85 0.86 0.87 0.88 0.89 0.90
## [91] 0.91 0.92 0.93 0.94 0.95 0.96 0.97 0.98 0.99 1.00
##
## $log_BFF_max_RMSE
## [1] 17.06539
##
## $max_RMSE
## [1] 1

```

Maximizing r for each specified tau2 (the same maximization parameter applies to all tests, examples are using the z test)

```

# default tau2
z_test_BFF(z_stat = z_score_one, n = 100, save = FALSE, maximize = TRUE) #one sample z-test

```

```
## [1] "The maximum r value for each specified tau2 is given. Re-run the test with the desired r to gen
```

```

##      tau2 optimal_r
## 1    0.0 19.999557
## 2    0.1 19.999557
## 3    0.2 14.099511
## 4    0.3  9.328432
## 5    0.4  6.945601
## 6    0.5  5.517541
## 7    0.6  4.566676
## 8    0.7  3.888154
## 9    0.8  3.379980
## 10   0.9  2.985431
## 11   1.0  2.669749

```

```
z_test_BFF(z_stat = z_score_two, one_sample = FALSE, n1 = 100, n2 = 100, save = FALSE, maximize = TRUE)
```

```
## [1] "The maximum r value for each specified tau2 is given. Re-run the test with the desired r to gen
```

```

##      tau2 optimal_r
## 1    0.0 19.999557

```

```
## 2 0.1 16.230267
## 3 0.2 7.980283
## 4 0.3 5.231476
## 5 0.4 3.857898
## 6 0.5 3.033729
## 7 0.6 2.484338
## 8 0.7 2.091946
## 9 0.8 1.797457
## 10 0.9 1.568316
## 11 1.0 1.384943
```

```
# user specified tau2
```

```
#single tau2
```

```
z_test_BFF(z_stat = z_score_one, n = 100, save = FALSE, tau2 = 0.5, maximize = TRUE) #one sample z-test
```

```
## [1] "The maximum r value for each specified tau2 is given. Re-run the test with the desired r to gen
```

```
## tau2 optimal_r
## 1 0.5 5.517541
```

```
z_test_BFF(z_stat = z_score_two, one_sample = FALSE, n1 = 100, n2 = 100, save = FALSE, tau2 = 0.5, maxim
```

```
## [1] "The maximum r value for each specified tau2 is given. Re-run the test with the desired r to gen
```

```
## tau2 optimal_r
## 1 0.5 3.033729
```

```
# vector of tau2 values
```

```
z_test_BFF(z_stat = z_score_one, n = 100, save = FALSE, tau2 = c(0.5, 0.8), maximize = TRUE) #one sampl
```

```
## [1] "The maximum r value for each specified tau2 is given. Re-run the test with the desired r to gen
```

```
## tau2 optimal_r
## 1 0.5 5.517541
## 2 0.8 3.379980
```

```
z_test_BFF(z_stat = z_score_two, one_sample = FALSE, n1 = 100, n2 = 100, save = FALSE, tau2 = c(0.5, 0.8), maxim
```

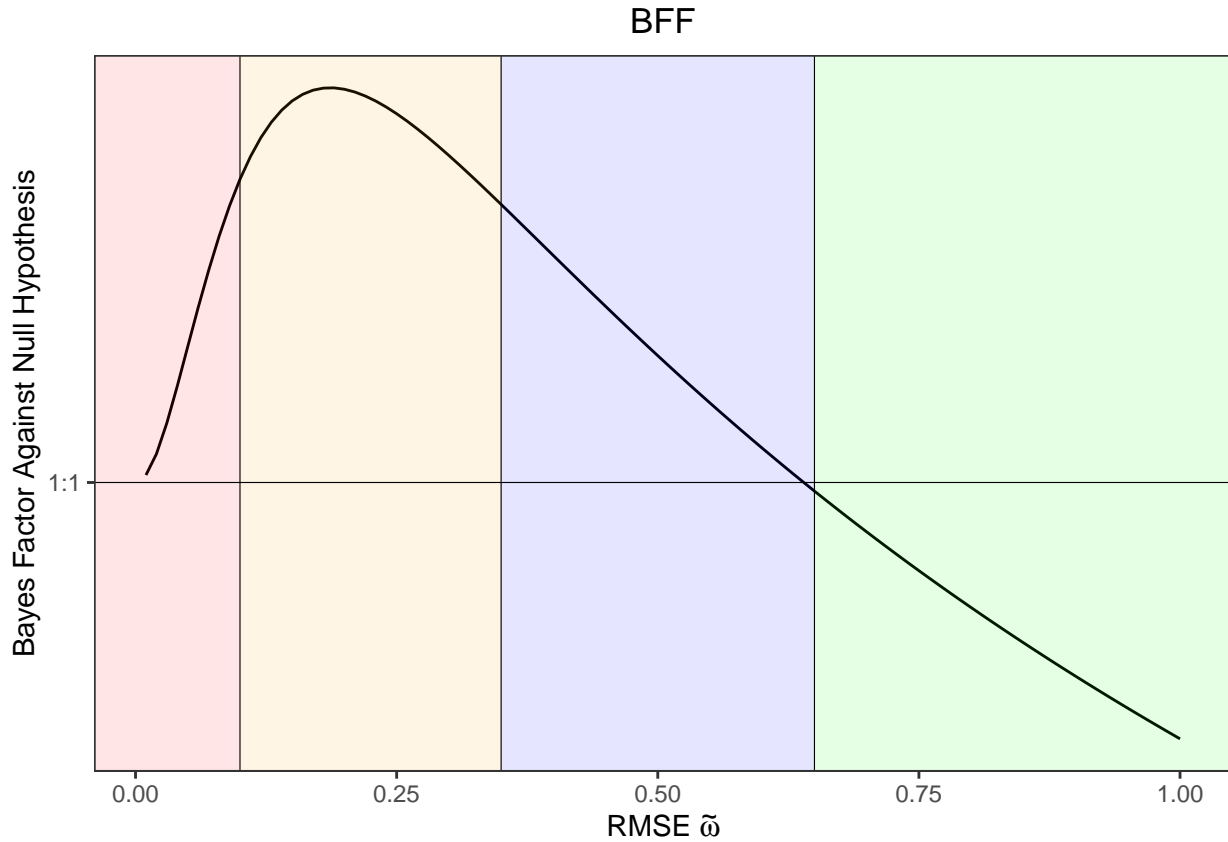
```
## [1] "The maximum r value for each specified tau2 is given. Re-run the test with the desired r to gen
```

```
## tau2 optimal_r
## 1 0.5 3.033729
## 2 0.8 1.797457
```

Plotting (the same maximization parameter applies to all tests, examples are using the z test)

Plots can be saved by setting “save = TRUE.” If plots are saved, they are saved in working directory.

```
# saving the plot as a pdf with default name (BFF_plot.pdf). Stored in working directory.
z_test_BFF(z_stat = z_score_one, n = 100, save = FALSE) #one sample z-test
```



```
## $log_BFF
## [1] 0.0349054315 0.1330411693 0.2780713763 0.4508582299 0.6347303814
## [6] 0.8173971987 0.9907158507 1.1497502736 1.2918417973 1.4158892946
## [11] 1.5218321330 1.6102849376 1.6822793122 1.7390813052 1.7820637133
## [16] 1.8126187218 1.8321002946 1.8417882982 1.8428682190 1.8364217854
## [21] 1.8234249737 1.8047508033 1.7811750518 1.7533835802 1.7219803694
## [26] 1.6874956789 1.6503939527 1.6110812515 1.5699120945 1.5271956638
## [31] 1.4832013691 1.4381637981 1.3922870924 1.3457487992 1.2987032490
## [36] 1.2512845108 1.2036089727 1.1557775922 1.1078778583 1.0599854993
## [41] 1.0121659718 0.9644757566 0.9169634880 0.8696709388 0.8226338781
## [46] 0.7758828214 0.7294436838 0.6833383525 0.6375851860 0.5921994521
## [51] 0.5471937110 0.5025781508 0.4583608826 0.4145481989 0.3711448007
## [56] 0.3281539976 0.2855778833 0.2434174901 0.2016729255 0.1603434923
## [61] 0.1194277940 0.0789238285 0.0388290705 -0.0008594558 -0.0401451128
## [66] -0.0790315921 -0.1175228654 -0.1556231395 -0.1933368178 -0.2306684654
## [71] -0.2676227792 -0.3042045607 -0.3404186927 -0.3762701182 -0.4117638223
## [76] -0.4469048162 -0.4816981226 -0.5161487641 -0.5502617517 -0.5840420758
## [81] -0.6174946978 -0.6506245432 -0.6834364950 -0.7159353890 -0.7481260088
## [86] -0.7800130825 -0.8116012788 -0.8428952049 -0.8738994039 -0.9046183532
## [91] -0.9350564629 -0.9652180750 -0.9951074624 -1.0247288283 -1.0540863059
## [96] -1.0831839586 -1.1120257796 -1.1406156924 -1.1689575512 -1.1970551411
##
## $effect_size
```

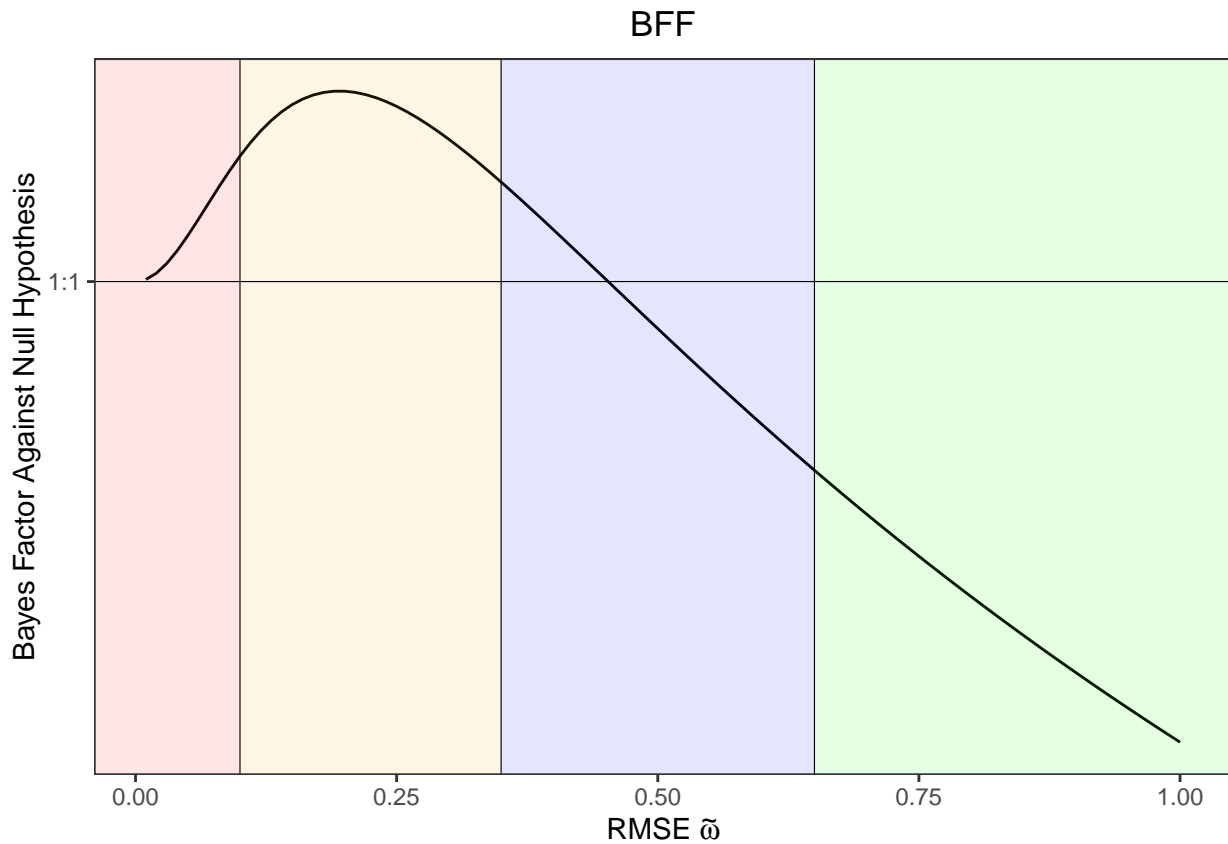


```
## [1] 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10 0.11 0.12 0.13 0.14 0.15
## [16] 0.16 0.17 0.18 0.19 0.20 0.21 0.22 0.23 0.24 0.25 0.26 0.27 0.28 0.29 0.30
## [31] 0.31 0.32 0.33 0.34 0.35 0.36 0.37 0.38 0.39 0.40 0.41 0.42 0.43 0.44 0.45
## [46] 0.46 0.47 0.48 0.49 0.50 0.51 0.52 0.53 0.54 0.55 0.56 0.57 0.58 0.59 0.60
## [61] 0.61 0.62 0.63 0.64 0.65 0.66 0.67 0.68 0.69 0.70 0.71 0.72 0.73 0.74 0.75
## [76] 0.76 0.77 0.78 0.79 0.80 0.81 0.82 0.83 0.84 0.85 0.86 0.87 0.88 0.89 0.90
## [91] 0.91 0.92 0.93 0.94 0.95 0.96 0.97 0.98 0.99 1.00
##
## $log_BFF_max_RMSE
## [1] 1.842868
##
## $max_RMSE
## [1] 0.19
```

```
z_test_BFF(z_stat = z_score_two, one_sample = FALSE, n1 = 100, n2 = 100, save = TRUE) #two sample z-test
```

```
## [1] "No savename argument given, plot saving as BFF_plot.pdf"
```

```
## Saving 6.5 x 4.5 in image
```



```
## $log_BFF
## [1] 0.008635319 0.033836210 0.073627268 0.125127811 0.185013056
## [6] 0.249939485 0.316853957 0.383167954 0.446819367 0.506258784
## [11] 0.560394388 0.608519994 0.650241147 0.685407051 0.714051579
## [16] 0.736344081 0.752549475 0.762996539 0.768053202 0.768107629
```

```

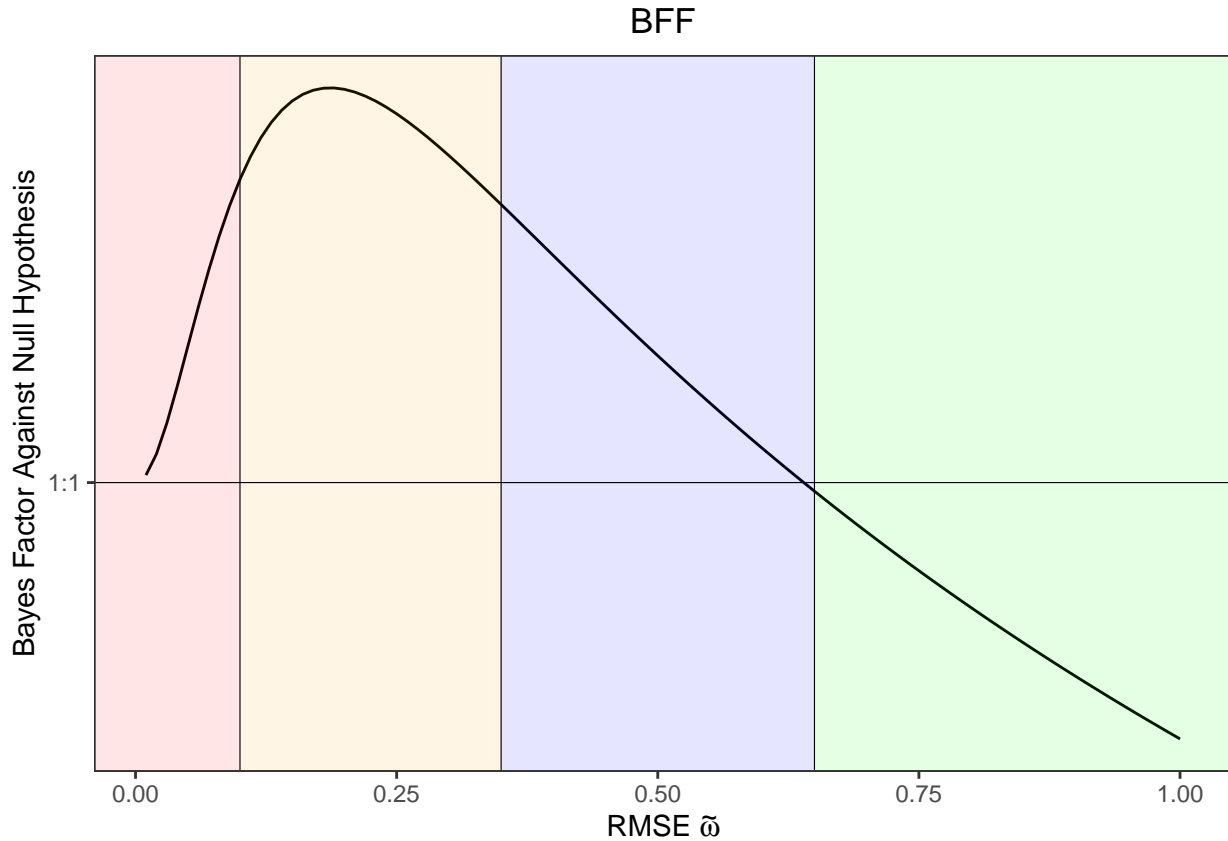
## [21] 0.763554046 0.754782359 0.742170782 0.726080810 0.706854011
## [26] 0.684810185 0.660246550 0.633437684 0.604635989 0.574072530
## [31] 0.541958114 0.508484504 0.473825712 0.438139313 0.401567735
## [36] 0.364239514 0.326270487 0.287764917 0.248816540 0.209509541
## [41] 0.169919447 0.130113956 0.090153681 0.050092842 0.009979885
## [46] -0.030141948 -0.070234116 -0.110262304 -0.150196016 -0.190008187
## [51] -0.229674851 -0.269174826 -0.308489443 -0.347602290 -0.386498992
## [56] -0.425167006 -0.463595435 -0.501774869 -0.539697231 -0.577355647
## [61] -0.614744321 -0.651858431 -0.688694025 -0.725247938 -0.761517706
## [66] -0.797501500 -0.833198056 -0.868606616 -0.903726878 -0.938558947
## [71] -0.973103289 -1.007360694 -1.041332240 -1.075019260 -1.108423314
## [76] -1.141546163 -1.174389744 -1.206956148 -1.239247605 -1.271266460
## [81] -1.303015161 -1.334496245 -1.365712324 -1.396666072 -1.427360216
## [86] -1.457797527 -1.487980811 -1.517912900 -1.547596645 -1.577034912
## [91] -1.606230574 -1.635186507 -1.663905586 -1.692390680 -1.720644648
## [96] -1.748670336 -1.776470575 -1.804048179 -1.831405939 -1.858546625
##
## $effect_size
## [1] 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10 0.11 0.12 0.13 0.14 0.15
## [16] 0.16 0.17 0.18 0.19 0.20 0.21 0.22 0.23 0.24 0.25 0.26 0.27 0.28 0.29 0.30
## [31] 0.31 0.32 0.33 0.34 0.35 0.36 0.37 0.38 0.39 0.40 0.41 0.42 0.43 0.44 0.45
## [46] 0.46 0.47 0.48 0.49 0.50 0.51 0.52 0.53 0.54 0.55 0.56 0.57 0.58 0.59 0.60
## [61] 0.61 0.62 0.63 0.64 0.65 0.66 0.67 0.68 0.69 0.70 0.71 0.72 0.73 0.74 0.75
## [76] 0.76 0.77 0.78 0.79 0.80 0.81 0.82 0.83 0.84 0.85 0.86 0.87 0.88 0.89 0.90
## [91] 0.91 0.92 0.93 0.94 0.95 0.96 0.97 0.98 0.99 1.00
##
## $log_BFF_max_RMSE
## [1] 0.7681076
##
## $max_RMSE
## [1] 0.2

# saving the plot as a pdf with user specified name.
z_test_BFF(z_stat = z_score_one, n = 100, save = FALSE, savename = "z-BFF-one.pdf") #one sample z-test

## [1] "z-BFF-one.pdf"

## Saving 6.5 x 4.5 in image

```

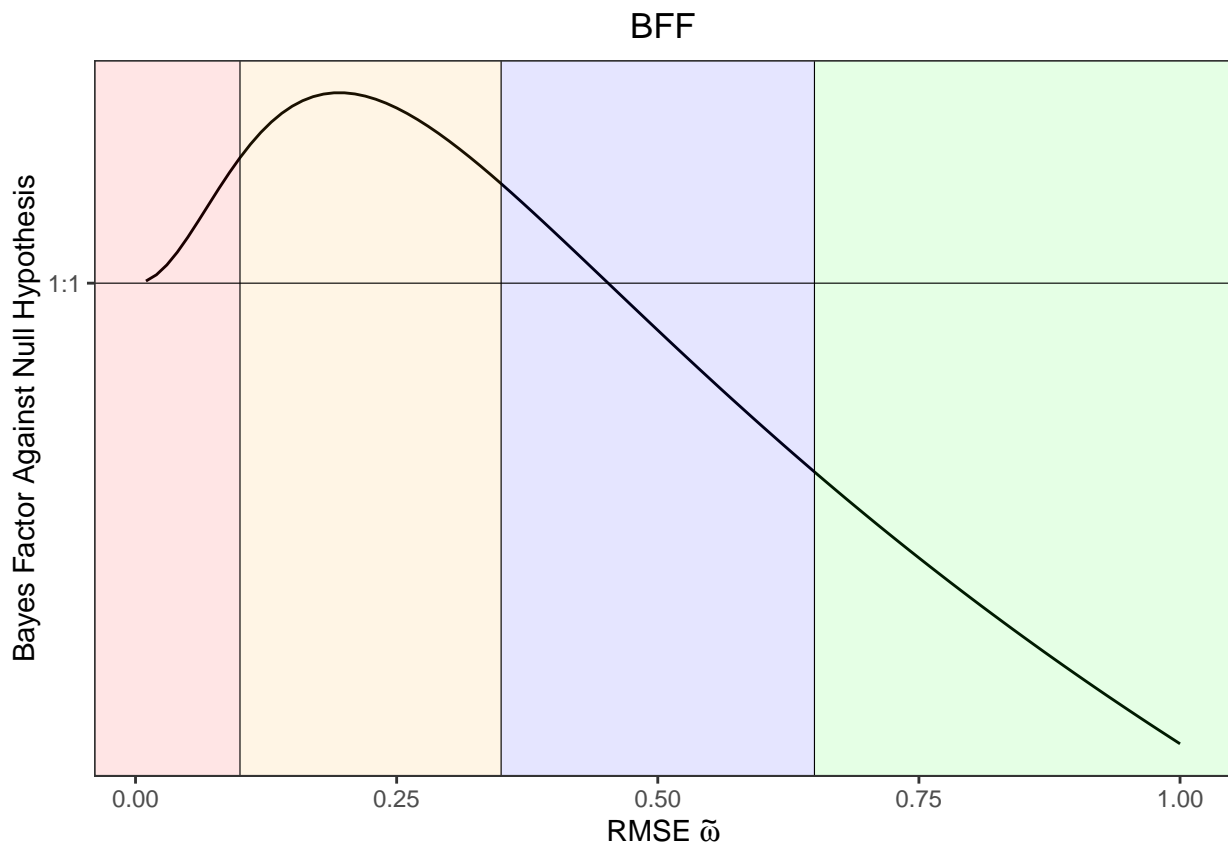


```
## $log_BFF
## [1] 0.0349054315 0.1330411693 0.2780713763 0.4508582299 0.6347303814
## [6] 0.8173971987 0.9907158507 1.1497502736 1.2918417973 1.4158892946
## [11] 1.5218321330 1.6102849376 1.6822793122 1.7390813052 1.7820637133
## [16] 1.8126187218 1.8321002946 1.8417882982 1.8428682190 1.8364217854
## [21] 1.8234249737 1.8047508033 1.7811750518 1.7533835802 1.7219803694
## [26] 1.6874956789 1.6503939527 1.6110812515 1.5699120945 1.5271956638
## [31] 1.4832013691 1.4381637981 1.3922870924 1.3457487992 1.2987032490
## [36] 1.2512845108 1.2036089727 1.1557775922 1.1078778583 1.0599854993
## [41] 1.0121659718 0.9644757566 0.9169634880 0.8696709388 0.8226338781
## [46] 0.7758828214 0.7294436838 0.6833383525 0.6375851860 0.5921994521
## [51] 0.5471937110 0.5025781508 0.4583608826 0.4145481989 0.3711448007
## [56] 0.3281539976 0.2855778833 0.2434174901 0.2016729255 0.1603434923
## [61] 0.1194277940 0.0789238285 0.0388290705 -0.0008594558 -0.0401451128
## [66] -0.0790315921 -0.1175228654 -0.1556231395 -0.1933368178 -0.2306684654
## [71] -0.2676227792 -0.3042045607 -0.3404186927 -0.3762701182 -0.4117638223
## [76] -0.4469048162 -0.4816981226 -0.5161487641 -0.5502617517 -0.5840420758
## [81] -0.6174946978 -0.6506245432 -0.6834364950 -0.7159353890 -0.7481260088
## [86] -0.7800130825 -0.8116012788 -0.8428952049 -0.8738994039 -0.9046183532
## [91] -0.9350564629 -0.9652180750 -0.9951074624 -1.0247288283 -1.0540863059
## [96] -1.0831839586 -1.1120257796 -1.1406156924 -1.1689575512 -1.1970551411
##
## $effect_size
## [1] 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10 0.11 0.12 0.13 0.14 0.15
## [16] 0.16 0.17 0.18 0.19 0.20 0.21 0.22 0.23 0.24 0.25 0.26 0.27 0.28 0.29 0.30
## [31] 0.31 0.32 0.33 0.34 0.35 0.36 0.37 0.38 0.39 0.40 0.41 0.42 0.43 0.44 0.45
## [46] 0.46 0.47 0.48 0.49 0.50 0.51 0.52 0.53 0.54 0.55 0.56 0.57 0.58 0.59 0.60
```

```
## [61] 0.61 0.62 0.63 0.64 0.65 0.66 0.67 0.68 0.69 0.70 0.71 0.72 0.73 0.74 0.75
## [76] 0.76 0.77 0.78 0.79 0.80 0.81 0.82 0.83 0.84 0.85 0.86 0.87 0.88 0.89 0.90
## [91] 0.91 0.92 0.93 0.94 0.95 0.96 0.97 0.98 0.99 1.00
##
## $log_BFF_max_RMSE
## [1] 1.842868
##
## $max_RMSE
## [1] 0.19
```

```
z_test_BFF(z_stat = z_score_two, one_sample = FALSE, n1 = 100, n2 = 100, save = TRUE, savename = "z-BFF")
```

```
## Saving 6.5 x 4.5 in image
```



```
## $log_BFF
## [1] 0.008635319 0.033836210 0.073627268 0.125127811 0.185013056
## [6] 0.249939485 0.316853957 0.383167954 0.446819367 0.506258784
## [11] 0.560394388 0.608519994 0.650241147 0.685407051 0.714051579
## [16] 0.736344081 0.752549475 0.762996539 0.768053202 0.768107629
## [21] 0.763554046 0.754782359 0.742170782 0.726080810 0.706854011
## [26] 0.684810185 0.660246550 0.633437684 0.604635989 0.574072530
## [31] 0.541958114 0.508484504 0.473825712 0.438139313 0.401567735
## [36] 0.364239514 0.326270487 0.287764917 0.248816540 0.209509541
## [41] 0.169919447 0.130113956 0.090153681 0.050092842 0.009979885
## [46] -0.030141948 -0.070234116 -0.110262304 -0.150196016 -0.190008187
```

```

## [51] -0.229674851 -0.269174826 -0.308489443 -0.347602290 -0.386498992
## [56] -0.425167006 -0.463595435 -0.501774869 -0.539697231 -0.577355647
## [61] -0.614744321 -0.651858431 -0.688694025 -0.725247938 -0.761517706
## [66] -0.797501500 -0.833198056 -0.868606616 -0.903726878 -0.938558947
## [71] -0.973103289 -1.007360694 -1.041332240 -1.075019260 -1.108423314
## [76] -1.141546163 -1.174389744 -1.206956148 -1.239247605 -1.271266460
## [81] -1.303015161 -1.334496245 -1.365712324 -1.396666072 -1.427360216
## [86] -1.457797527 -1.487980811 -1.517912900 -1.547596645 -1.577034912
## [91] -1.606230574 -1.635186507 -1.663905586 -1.692390680 -1.720644648
## [96] -1.748670336 -1.776470575 -1.804048179 -1.831405939 -1.858546625
##
## $effect_size
## [1] 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10 0.11 0.12 0.13 0.14 0.15
## [16] 0.16 0.17 0.18 0.19 0.20 0.21 0.22 0.23 0.24 0.25 0.26 0.27 0.28 0.29 0.30
## [31] 0.31 0.32 0.33 0.34 0.35 0.36 0.37 0.38 0.39 0.40 0.41 0.42 0.43 0.44 0.45
## [46] 0.46 0.47 0.48 0.49 0.50 0.51 0.52 0.53 0.54 0.55 0.56 0.57 0.58 0.59 0.60
## [61] 0.61 0.62 0.63 0.64 0.65 0.66 0.67 0.68 0.69 0.70 0.71 0.72 0.73 0.74 0.75
## [76] 0.76 0.77 0.78 0.79 0.80 0.81 0.82 0.83 0.84 0.85 0.86 0.87 0.88 0.89 0.90
## [91] 0.91 0.92 0.93 0.94 0.95 0.96 0.97 0.98 0.99 1.00
##
## $log_BFF_max_RMSE
## [1] 0.7681076
##
## $max_RMSE
## [1] 0.2

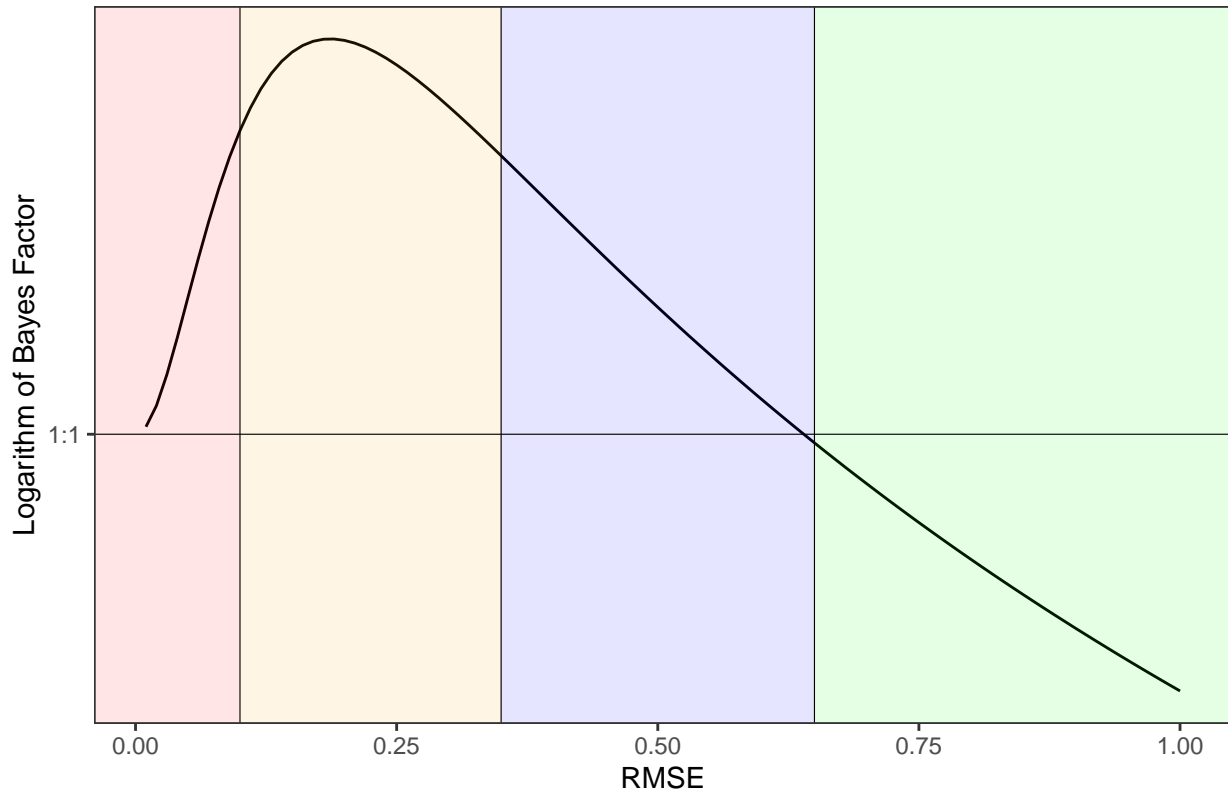
```

```

# customizing x-axis labels, y-axis labels and main title
z_test_BFF(z_stat = z_score_one, n = 100, save = FALSE, xlab = "RMSE", ylab = "Logarithm of Bayes Factor")

```

BFF curves



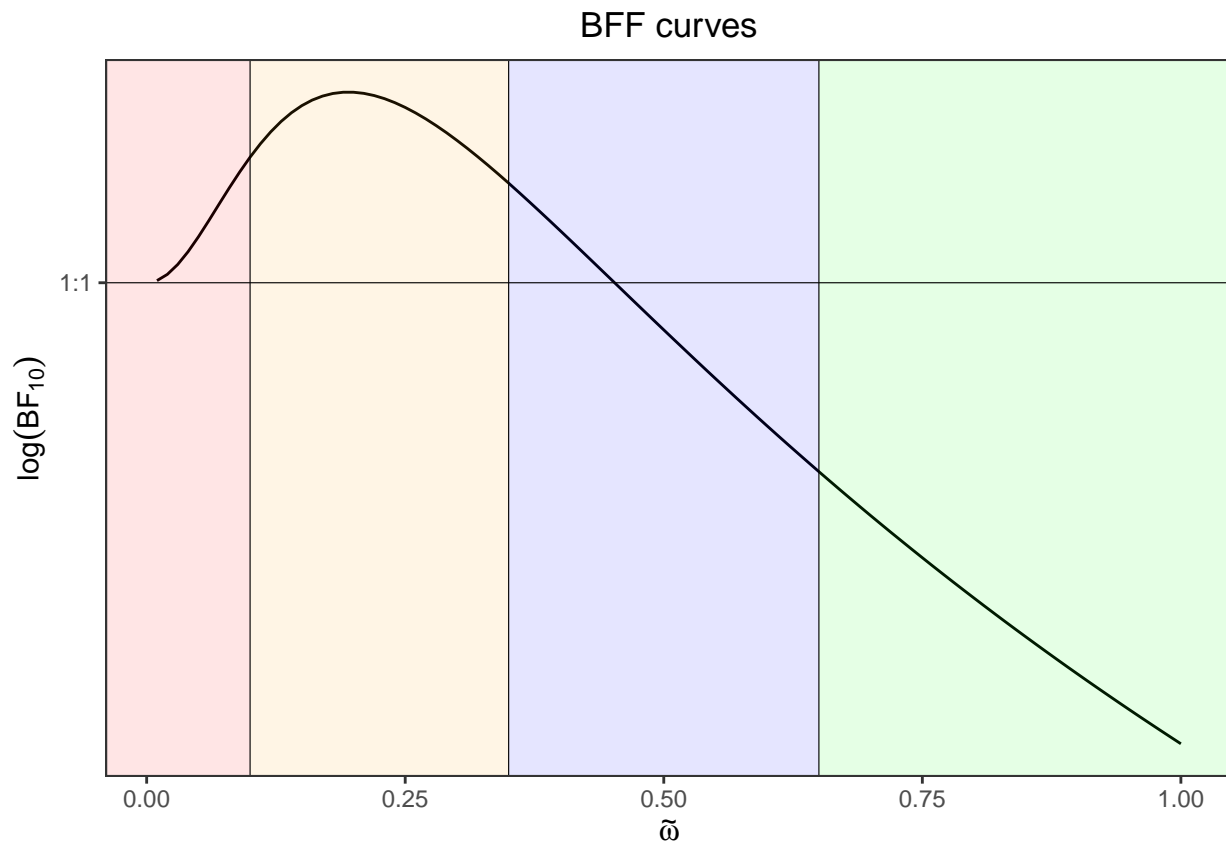
```
## $log_BFF
## [1] 0.0349054315 0.1330411693 0.2780713763 0.4508582299 0.6347303814
## [6] 0.8173971987 0.9907158507 1.1497502736 1.2918417973 1.4158892946
## [11] 1.5218321330 1.6102849376 1.6822793122 1.7390813052 1.7820637133
## [16] 1.8126187218 1.8321002946 1.8417882982 1.8428682190 1.8364217854
## [21] 1.8234249737 1.8047508033 1.7811750518 1.7533835802 1.7219803694
## [26] 1.6874956789 1.6503939527 1.6110812515 1.5699120945 1.5271956638
## [31] 1.4832013691 1.4381637981 1.3922870924 1.3457487992 1.2987032490
## [36] 1.2512845108 1.2036089727 1.1557775922 1.1078778583 1.0599854993
## [41] 1.0121659718 0.9644757566 0.9169634880 0.8696709388 0.8226338781
## [46] 0.7758828214 0.7294436838 0.6833383525 0.6375851860 0.5921994521
## [51] 0.5471937110 0.5025781508 0.4583608826 0.4145481989 0.3711448007
## [56] 0.3281539976 0.2855778833 0.2434174901 0.2016729255 0.1603434923
## [61] 0.1194277940 0.0789238285 0.0388290705 -0.0008594558 -0.0401451128
## [66] -0.0790315921 -0.1175228654 -0.1556231395 -0.1933368178 -0.2306684654
## [71] -0.2676227792 -0.3042045607 -0.3404186927 -0.3762701182 -0.4117638223
## [76] -0.4469048162 -0.4816981226 -0.5161487641 -0.5502617517 -0.5840420758
## [81] -0.6174946978 -0.6506245432 -0.6834364950 -0.7159353890 -0.7481260088
## [86] -0.7800130825 -0.8116012788 -0.8428952049 -0.8738994039 -0.9046183532
## [91] -0.9350564629 -0.9652180750 -0.9951074624 -1.0247288283 -1.0540863059
## [96] -1.0831839586 -1.1120257796 -1.1406156924 -1.1689575512 -1.1970551411
##
## $effect_size
## [1] 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10 0.11 0.12 0.13 0.14 0.15
## [16] 0.16 0.17 0.18 0.19 0.20 0.21 0.22 0.23 0.24 0.25 0.26 0.27 0.28 0.29 0.30
## [31] 0.31 0.32 0.33 0.34 0.35 0.36 0.37 0.38 0.39 0.40 0.41 0.42 0.43 0.44 0.45
## [46] 0.46 0.47 0.48 0.49 0.50 0.51 0.52 0.53 0.54 0.55 0.56 0.57 0.58 0.59 0.60
```

```
## [61] 0.61 0.62 0.63 0.64 0.65 0.66 0.67 0.68 0.69 0.70 0.71 0.72 0.73 0.74 0.75
## [76] 0.76 0.77 0.78 0.79 0.80 0.81 0.82 0.83 0.84 0.85 0.86 0.87 0.88 0.89 0.90
## [91] 0.91 0.92 0.93 0.94 0.95 0.96 0.97 0.98 0.99 1.00
##
## $log_BFF_max_RMSE
## [1] 1.842868
##
## $max_RMSE
## [1] 0.19
```

```
z_BFF_two = z_test_BFF(z_stat = z_score_two, one_sample = FALSE, n1 = 100, n2 = 100, save = TRUE, xlab =
```

```
## [1] "No savename argument given, plot saving as BFF_plot.pdf"
```

```
## Saving 6.5 x 4.5 in image
```



Default choices of tau2 for common statistical tests