

# Package ‘nparcomp’

February 14, 2012

**Type** Package

**Title** nparcomp-package

**Version** 1.0-1

**Date** 2011-02-17

**Author** Frank Konietschke

**Maintainer** Frank Konietschke <fkoni@gwgd.de>

**Depends** multcomp, mvtnorm

**Description** With this package, it is possible to compute nonparametric simultaneous confidence intervals for relative contrast effects in the unbalanced one way layout. Moreover, it computes simultaneous p-values. The simultaneous confidence intervals can be computed using multivariate normal distribution, multivariate t-distribution with a Satterthwaite Approximation of the degree of freedom or using multivariate range preserving transformations with Logit or Probit as transformation function. 2 sample comparisons can be performed with the same methods described above. There is no assumption on the underlying distribution function, only that the data have to be at least ordinal numbers.

**License** GPL

**Repository** CRAN

**Date/Publication** 2011-02-18 17:29:54

## R topics documented:

nparcomp-package	2
colu	4
impla	5
liver	5
npar.t.test	6
nparcomp	8
weight.matrix	11

**Index****13**


---

nparcomp-package	<i>Nparcomp: Nonparametric relative contrast effects. With this package it is possible to compute nonparametric relative contrast effects and simultaneous confidence intervals for the effects.</i>
------------------	--

---

**Description**

With this package, it is possible to compute nonparametric simultaneous confidence intervals for relative contrast effects in the unbalanced one way layout. Moreover, it computes simultaneous p-values. The simultaneous confidence intervals can be computed using multivariate normal distribution, multivariate t-distribution with a Satterthwaite Approximation of the degree of freedom or using multivariate range preserving transformations with Logit or Probit as transformation function. 2 sample comparisons can be performed with the same methods described above. There is no assumption on the underlying distribution function, only that the data have to be at least ordinal numbers.

**Details**

Package:	nparcomp
Type:	Package
Version:	1.0-1
Date:	2011-02-17
License:	GPL

**Author(s)**

Frank Konietschke

Maintainer: Frank Konietschke <fkoniet@gwdg.de>

**References**

Konietschke, F., Brunner, E., Hothorn, L.A. (2008). Nonparametric Relative Contrast Effects: Asymptotic Theory and Small Sample Approximations, Konietschke, F., Brunner, E., Hothorn, L.A. (2008). Simultaneous Confidence Intervals for Relative Effects in Dunnett Comparisons, Munzel, U., Hothorn, L.A. (2001). A unified Approach to Simultaneous Rank Tests Procedures in the Unbalanced One-way Layout. *Biometric Journal*, 43, 553-569.

**Examples**

```
# two sample comparisons: Nonparametric Behrens-Fisher Problem
```

```
data(impla)
npar.t.test(impla~group, data = impla,
  asy.method = "t.app", p.perm = TRUE, alternative = "two.sided")

npar.t.test(impla~group, data = impla,
  asy.method = "logit", p.perm = TRUE, alternative = "two.sided")

  # no permutation test

npar.t.test(impla~group, data = impla,
  asy.method = "t.app", p.perm = FALSE, alternative = "two.sided")

#--Analysis of relative contrast effects in different contrast settings

data(liver)

  # Williams Contrast

nparcomp(weight ~dosage, data=liver, asy.method = "probit",
  type = "Williams", alternative = "two.sided",
  plot.simci = TRUE, info = TRUE)

  # Dunnett Contrast

nparcomp(weight ~dosage, data=liver, asy.method = "probit",
  type = "Dunnett", alternative = "two.sided",
  plot.simci = TRUE, info = TRUE)

  # Dunnett dose 3 is baseline

nparcomp(weight ~dosage, data=liver, asy.method = "probit",
  type = "Dunnett", control = "3", alternative = "two.sided",
  plot.simci = TRUE, info = TRUE)

data(colu)

## Not run:

  # Tukey comparison - one sided(lower)

nparcomp(corpora ~dose, data=colu, asy.method = "mult.t",
  type = "Tukey", alternative = "lower", plot.simci = TRUE, info = TRUE)

  # Tukey comparison- one sided(greater)

nparcomp(corpora ~dose, data=colu, asy.method = "mult.t",
  type = "Tukey", alternative = "greater", plot.simci = TRUE, info = TRUE)
```

```

# Tukey comparison- one sided(lower)

nparcomp(corpora ~dose, data=colu, asy.method = "mult.t",
type = "Tukey",alternative = "lower", plot.simci = TRUE, info = TRUE)

## End(Not run)

# Marcus comparison- one sided(greater)

nparcomp(corpora ~dose, data=colu, asy.method = "logit",
type = "Marcus",alternative = "greater", plot.simci = TRUE, info = TRUE)

```

---

colu

*Numbers of corpora lutea*


---

### Description

Data from a fertility trial with 92 female Wistar rats: numbers of the corpora lutea in a placebo group and in 4 dose groups with an increasing dose of an active treatment

### Usage

```
data(colu)
```

### Format

A data frame with 92 observations on the following 2 variables.

dose a factor with levels dose1 dose2 dose3 dose4 Placebo, where Placebo is the placebo group and dose1-dose4 are the 4 dose groups with an increasing dose

corpora a numeric vector containing the numbers of the corpora lutea

### Details

The objective is to test if the active treatment influence the fertility of the rats

### Source

Brunner, E., Munzel, U. (2002): Nichtparametrische Datenanalyse - Unverbundene Stichproben. Statistik und ihre Anwendungen, Springer, Berlin Heidelberg New York

### Examples

```

library(nparcomp)
data(colu)
boxplot(corpora~dose,data=colu)

```

---

impla	<i>Numbers of implantations</i>
-------	---------------------------------

---

**Description**

Data from a fertility trial with 29 female Wistar rats: numbers of the implantations in a placebo group and in an active treatment group

**Usage**

```
data(impla)
```

**Format**

A data frame with 29 observations on the following 2 variables.

group a factor with levels Placebo Verum, where Verum denotes the active treatment group

impla a numeric vector

**Details**

The objective is to test if the active treatment influence the fertility of the rats

**Source**

Brunner, E., Munzel, U. (2002): Nichtparametrische Datenanalyse - Unverbundene Stichproben. Statistik und ihre Anwendungen, Springer, Berlin Heidelberg New York

**Examples**

```
library(nparcomp)
data(impla)
boxplot(impla~group,data=impla)
```

---

liver	<i>Relative liver weights</i>
-------	-------------------------------

---

**Description**

Data from a toxicity trial with male Wistar rats: Relative liver weight in a negative control group and in 4 dose groups with an increasing dose of an active treatment. After treatment the relative liver weight of the rats was computed.

**Usage**

```
data(liver)
```

**Format**

A data frame with 38 observations on the following 2 variables.

dosage a numeric vector

weight a numeric vector

**Details**

The objective is to test if the active treatment influence the liver weight of the rats.

**Source**

Brunner, E., Munzel, U. (2002): Nichtparametrische Datenanalyse - Unverbundene Stichproben. Statistik und ihre Anwendungen, Springer, Berlin Heidelberg New York

**Examples**

```
data(liver)
boxplot(weight~dosage,data=liver)
```

---

npar.t.test

*The nonparametric Behrens-Fisher problem - confidence interval for a relative effect of two groups*

---

**Description**

The function npar.t.test performs two sample tests for the nonparametric Behrens-Fisher problem, that is testing the hypothesis

$$H_0 : p = 1/2$$

, where  $p$  denotes the relative effect of 2 independent samples and computes confidence intervals for the relative effect  $p$ . The statistics are computed using standard normal distribution, Satterthwaite t-Approximation and variance stabilising transformations (Probit and Logit transformation function). For small samples there is also a studentized permutation test implemented. npar.t.test also computes one-sided and two-sided confidence intervals and p-values. The confidence interval is plotted.

**Usage**

```
npar.t.test(formula, data, conflevel = 0.05,
  alternative = c("two.sided", "lower", "greater"), rounds = 3,
  asy.method = c("logit", "probit", "normal", "t.app"),
  p.permu = TRUE, plot.simci = TRUE, info = TRUE)
```

**Arguments**

formula	formula A two-sided 'formula' specifying a numeric response variable and a factor with two levels. If the factor contains more than two levels, an error message will be returned
data	data A dataframe containing the variables specified in formula
conlevel	conlevel The confidence level for the 1 - conlevel confidence intervals. By default it is 0.05
alternative	alternative character string defining the alternative hypothesis, one of "two.sided", "lower" or "greater"
rounds	Number of rounds for the numeric values of the output. By default it is rounds=3
asy.method	asy.method character string defining the asymptotic approximation method, one of "logit", for using the logit transformation function, "probit", for using the probit transformation function, "normal", for using the standard normal distribution or "t.app" for using a t-Distribution with a Satterthwaite Approximation
p.permu	p.permu A logical indicating whether you want to get the p-value of a studentized permutation test
plot.simci	plot.simci A logical indicating whether you want a plot of the confidence interval
info	info A logical whether you want a brief overview with informations about the output

**Value**

Data.Info	List of samples and sample sizes
relative.effects	Comparison: relative effect p(a,b) of the two samples 'a' and 'b', relative.effect: estimated relative effect, confidence.interval: confidence interval for relative effect, t.value: teststatistic p.value: p-value for the hypothesis by the choosen approximation method, p.perm : p-value of the permutation test
Wilcoxon.Test	Comparison: relative effect p(a,b) of the samples 'a' and 'b', rel.effect: estimated relative effect, p.value: p-Value of an asymptotic Wilcoxon test

**Note**

If the samples are completely seperated the variance estimator are Zero by construction. In these cases the Null-estimator are replaced by a replacing method as proposed in the paper from Neubert and Brunner (2006). Estimated relative effects with 0 or 1 are replaced with 0.001, 0.999 respectively.

**Author(s)**

Frank Konietschke

## References

Brunner, E., Munzel, U. (2000). The Nonparametric Behrens-Fisher Problem: Asymptotic Theory and a Small Sample Approximation. *Biometrical Journal* 42, 17 -25. Neubert, K., Brunner, E., (2006). A Studentized Permutation Test for the Nonparametric Behrens-Fisher Problem. *Computational Statistics and Data Analysis*.

## See Also

For multiple comparison procedures based on relative effects, see [nparcomp](#)

## Examples

```
data(impla)
npar.t.test(impla~group, data = impla, asy.method = "t.app",
  p.perm = TRUE, alternative = "two.sided")
```

---

nparcomp

*Nonparametric relative contrast effects: Simultaneous confidence intervals and p-values*

---

## Description

The function `nparcomp` computes the estimator of nonparametric relative contrast effects, simultaneous confidence intervals for the effects and simultaneous p-values based on special contrasts like "Tukey", "Dunnett", "Sequen", "Williams", "Changepoint", "AVE", "McDermott", "Marcus". The statistics are computed using multivariate normal distribution, multivariate Satterthwaite t-Approximation and multivariate transformations (Probit and Logit transformation function). The function 'nparcomp' also computes one-sided and two-sided confidence intervals and p-values. The confidence intervals are plotted.

## Usage

```
nparcomp(formula, data,
  type = c("UserDefined", "Tukey", "Dunnett", "Sequen", "Williams", "Changepoint",
  "AVE", "McDermott", "Marcus", "UmbrellaWilliams"), control = NULL, conflevel = 0.95,
  alternative = c("two.sided", "lower", "greater"), rounds = 3, correlation = FALSE,
  asy.method = c("logit", "probit", "normal", "mult.t"), plot.simci = TRUE, info = TRUE,
  contrast.matrix = NULL)
```

## Arguments

formula	formula A two-sided 'formula' specifying a numeric response variable and a factor with more than two levels. If the factor contains less than 3 levels, an error message will be returned
data	data A dataframe containing the variables specified in formula

type	type Character string defining the type of contrast. It should be one of "Tukey", "Dunnett", "Sequen", "Williams", "Changepoint", "AVE", "McDermott", "Marcus", "UmbrellaWilliams"
control	control Character string defining the control group in Dunnett comparisons. By default it is the first group by lexicographical ordering
conflevel	conflevel The confidence level for the 1 - conflevel confidence intervals. By default it is 0.05
alternative	alternative Character string defining the alternative hypothesis, one of "two.sided", "lower" or "greater"
rounds	Number of rounds for the numeric values of the output. By default it is rounds=3
correlation	correlation A logical whether the estimated correlation matrix and covariance matrix should be printed
asy.method	asy.method character string defining the asymptotic approximation method, one of "logit", for using the logit transformation function, "probit", for using the probit transformation function, "normal", for using the multivariate normal distribution or "mult.t" for using a multivariate t-distribution with a Satterthwaite Approximation
plot.simci	plot.simci A logical indicating whether you want a plot of the confidence intervals
info	info A logical whether you want a brief overview with informations about the output
contrast.matrix	optional, a user defined contrast matrix, ignored if...

**Value**

weight.matrix	The weight matrix for the choosen nonparametric relative contrast effect
Data.Info	List of samples and sample sizes
relative.effects	Comparison: relative contrast effect , relative.effect: estimated relative contrast effect, confidence.interval: simultaneous confidence interval for relative contrast effect, t.value: teststatistic p.value: simultaneous p-values for the hypothesis by the choosen approximation method

**Note**

If the samples are completely seperated the variance estimators are Zero by construction. In these cases the Null-estimator are replaced by 0.001. Estimated relative effects with 0 or 1 are replaced with 0.001, 0.999 respectively. For the analysis, the R packages 'multcomp' and 'mvtnorm' are required.

**Author(s)**

Frank Konietschke

## References

Konietschke, F., Brunner, E., Hothorn, L.A. (2008). Nonparametric Relative Contrast Effects: Asymptotic Theory and Small Sample Approximations, Konietschke, F., Brunner, E., Hothorn, L.A. (2008). Simultaneous Confidence Intervals for Relative Effects in Dunnett Comparisons, Munzel, U., Hothorn, L.A. (2001). A unified Approach to Simultaneous Rank Tests Procedures in the Unbalanced One-way Layout. *Biometric Journal*, 43, 553-569.

## See Also

For two-sample comparisons based on relative effects, see [npar.t.test](#)

## Examples

```
data(liver)

# Williams Contrast

nparcomp(weight ~dosage, data=liver, asy.method = "probit",
type = "Williams", alternative = "two.sided", plot.simci = TRUE, info = TRUE)

# Dunnett Contrast

nparcomp(weight ~dosage, data=liver, asy.method = "probit",
type = "Dunnett", alternative = "two.sided", plot.simci = TRUE, info = TRUE)

# Dunnett dose 3 is baseline

nparcomp(weight ~dosage, data=liver, asy.method = "probit",
type = "Dunnett", control = "3", alternative = "two.sided",
plot.simci = TRUE, info = TRUE)

data(colu)

## Not run:

# Tukey comparison- one sided(lower)

nparcomp(corpora ~dose, data=colu, asy.method = "mult.t",
type = "Tukey", alternative = "lower", plot.simci = TRUE, info = TRUE)

# Tukey comparison- one sided(greater)

nparcomp(corpora ~dose, data=colu, asy.method = "mult.t",
type = "Tukey", alternative = "greater", plot.simci = TRUE, info = TRUE)

# Tukey comparison- one sided(lower)

nparcomp(corpora ~dose, data=colu, asy.method = "mult.t",
type = "Tukey", alternative = "lower", plot.simci = TRUE, info = TRUE)
```

```
## End(Not run)

# Marcus comparison- one sided(greater)

nparcomp(corpora ~dose, data=colu, asy.method = "logit",
  type = "Marcus", alternative = "greater", plot.simci = TRUE, info = TRUE)
```

---

weight.matrix	<i>Nonparametric relative contrast effects: the weight matrix</i>
---------------	---

---

### Description

The function `weight.matrix` computes the weight matrix for a given contrast with which the estimator for the relative contrast effect is computed

### Usage

```
weight.matrix(n, type = c("UserDefined", "Tukey", "AVE",
  "Dunnett", "Sequen", "Changepoint", "Marcus", "McDermott",
  "Williams", "UmbrellaWilliams"), base = 1, contrast.matrix = NULL)
```

### Arguments

<code>n</code>	n vector of sample sizes
<code>type</code>	type Character string defining the type of contrast. It should be one of "Tukey", "Dunnett", "Sequen", "Williams", "Changepoint", "AVE", "McDermott", "Marcus"
<code>base</code>	base Number of the baseline values in Dunnett Comparisons. By default it is base = 1
<code>contrast.matrix</code>	optional, a user-defined contrast.matrix ...

### Details

The function needs the R-function 'contrMat' from the R-package 'multcomp'.

### Value

The function returns the weight matrix which can be used to compute the estimator of the relative contrast effect

### Note

For the analysis, the R-package 'multcomp' is required.

**Author(s)**

Frank Konietschke

**References**

Konietschke, F., Brunner, E., Hothorn, L.A. (2008). Nonparametric Relative Contrast Effects: Asymptotic Theory and Small Sample Approximations, Konietschke, F., Brunner, E., Hothorn, L.A. (2008). Simultaneous Confidence Intervals for Relative Effects in Dunnett Comparisons.

**See Also**

contrMat in package **multcomp** for contrast matrices

**Examples**

```
n<-c(10,20,30,40)
weight.matrix(n, "Tukey") # result: identity matrix by construction
weight.matrix(n, "Dunnett", base = 3) # Weight matrix for Dunnett comparison - 3rd group is baseline
weight.matrix(n, "Changepoint") # weight matrix for relative changepoint effect

# For comparison, see the contrasts matrices
# available in the multcomp package:

library(multcomp)
n<-c(10,10,20,30,40)
contrMat(n, "Changepoint") # Contrast matrix for Changepoint comparisons
```

# Index

\*Topic **datasets**

colu, [4](#)  
impla, [5](#)  
liver, [5](#)

\*Topic **htest**

npar.t.test, [6](#)  
nparcomp, [8](#)  
nparcomp-package, [2](#)  
weight.matrix, [11](#)

\*Topic **package**

nparcomp-package, [2](#)

colu, [4](#)

impla, [5](#)

liver, [5](#)

npar.t.test, [6](#), [10](#)

nparcomp, [8](#), [8](#)

nparcomp-package, [2](#)

weight.matrix, [11](#)