

# Package ‘pairwiseComparisons’

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**Type** Package

**Title** Multiple Pairwise Comparison Tests

**Version** 0.1.1

**Maintainer** Indrajeet Patil <patilindrajeet.science@gmail.com>

**Description** Multiple pairwise comparison tests for one-way analysis of variance for both between-subjects and within-subjects designs. Currently, it supports only the most common types of statistical analyses and tests: parametric (Welch's and Student's t-test), nonparametric (Durbin-Conover test and Dwass-Steel-Crichtlow-Fligner test), robust (Yuen's trimmed means test).

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**URL** <https://indrajeetpatil.github.io/pairwiseComparisons/>,  
<https://github.com/IndrajeetPatil/pairwiseComparisons>

**BugReports** <https://github.com/IndrajeetPatil/pairwiseComparisons/issues>

**Depends** R (>= 3.5.0)

**Imports** broomExtra (>= 0.0.5), crayon (>= 1.3.4), dplyr (>= 0.8.3),  
forcats (>= 0.4.0), groupedstats (>= 0.0.9), jmv (>= 0.9.6.1),  
purrr (>= 0.3.2), rlang (>= 0.4.0), stats, stringr (>= 1.4.0),  
tibble (>= 2.1.3), tidyr (>= 1.0.0), utils, WRS2 (>= 1.0-0)

**Suggests** ggplot2, knitr, rmarkdown, spelling, testthat

**VignetteBuilder** knitr

**Encoding** UTF-8

**Language** en-US

**LazyData** true

**RoxygenNote** 6.1.99.9000

**NeedsCompilation** no

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**Repository** CRAN

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---

bugs_long	<i>Tidy version of the "Bugs" dataset.</i>
-----------	--

---

### Description

Tidy version of the "Bugs" dataset.

### Usage

```
bugs_long
```

### Format

A data frame with 372 rows and 6 variables

- subject. Dummy identity number for each participant.
- gender. Participant's gender (Female, Male).
- region. Region of the world the participant was from.
- education. Level of education.
- condition. Condition of the experiment the participant gave rating for (**LDLF**: low frighteningness and low disgustingness; **LFHD**: low frighteningness and high disgustingness; **HFHD**: high frighteningness and low disgustingness; **HFHD**: high frighteningness and high disgustingness).
- desire. The desire to kill an arthropod was indicated on a scale from 0 to 10.

### Details

This data set, "Bugs", provides the extent to which men and women want to kill arthropods that vary in frighteningness (low, high) and disgustingness (low, high). Each participant rates their attitudes towards all anthropods. Subset of the data reported by Ryan et al. (2013).

### Source

<https://www.sciencedirect.com/science/article/pii/S0747563213000277>

**Examples**

```
dim(iris_long)
head(iris_long)
dplyr::glimpse(iris_long)
```

---

iris\_long

*Edgar Anderson's Iris Data in long format.*

---

**Description**

Edgar Anderson's Iris Data in long format.

**Usage**

```
iris_long
```

**Format**

A data frame with 600 rows and 5 variables

- id. Dummy identity number for each flower (150 flowers in total).
- Species. The species are *Iris setosa*, *versicolor*, and *virginica*.
- condition. Factor giving a detailed description of the attribute (Four levels: "Petal.Length", "Petal.Width", "Sepal.Length", "Sepal.Width").
- attribute. What attribute is being measured ("Sepal" or "Petal").
- measure. What aspect of the attribute is being measured ("Length" or "Width").
- value. Value of the measurement.

**Details**

This famous (Fisher's or Anderson's) iris data set gives the measurements in centimeters of the variables sepal length and width and petal length and width, respectively, for 50 flowers from each of 3 species of iris. The species are *Iris setosa*, *versicolor*, and *virginica*.

This is a modified dataset from datasets package.

**Source**

<https://stat.ethz.ch/R-manual/R-devel/library/datasets/html/iris.html>

**Examples**

```
dim(iris_long)
head(iris_long)
dplyr::glimpse(iris_long)
```

---

`movies_long`*Movie information and user ratings from IMDB.com (long format).*

---

**Description**

Movie information and user ratings from IMDB.com (long format).

**Usage**

```
movies_long
```

**Format**

A data frame with 1,579 rows and 8 variables

- `title`. Title of the movie.
- `year`. Year of release.
- `budget`. Total budget (if known) in US dollars
- `length`. Length in minutes.
- `rating`. Average IMDB user rating.
- `votes`. Number of IMDB users who rated this movie.
- `mpaa`. MPAA rating.
- `genre`. Different genres of movies (action, animation, comedy, drama, documentary, romance, short).

**Details**

Modified dataset from `ggplot2movies` package.

The internet movie database, <http://imdb.com/>, is a website devoted to collecting movie data supplied by studios and fans. It claims to be the biggest movie database on the web and is run by amazon. More about information `imdb.com` can be found online, [http://imdb.com/help/show\\_leaf?about](http://imdb.com/help/show_leaf?about), including information about the data collection process, [http://imdb.com/help/show\\_leaf?infosource](http://imdb.com/help/show_leaf?infosource).

Movies were are identical to those selected for inclusion in `movies_wide` but this dataset has been constructed such that every movie appears in one and only one genre category.

**Source**

<https://CRAN.R-project.org/package=ggplot2movies>

**Examples**

```
dim(movies_long)
head(movies_long)
dplyr::glimpse(movies_long)
```

---

movies_wide	<i>Movie information and user ratings from IMDB.com (wide format).</i>
-------------	--

---

### Description

Movie information and user ratings from IMDB.com (wide format).

### Usage

```
movies_wide
```

### Format

A data frame with 1,579 rows and 13 variables

- title. Title of the movie.
- year. Year of release.
- budget. Total budget in millions of US dollars
- length. Length in minutes.
- rating. Average IMDB user rating.
- votes. Number of IMDB users who rated this movie.
- mpaa. MPAA rating.
- action, animation, comedy, drama, documentary, romance, short. Binary variables representing if movie was classified as belonging to that genre.
- NumGenre. The number of different genres a film was classified in an integer between one and four

### Details

Modified dataset from ggplot2movies package.

The internet movie database, <http://imdb.com/>, is a website devoted to collecting movie data supplied by studios and fans. It claims to be the biggest movie database on the web and is run by amazon. More information about imdb.com can be found online, [http://imdb.com/help/show\\_leaf?about](http://imdb.com/help/show_leaf?about), including information about the data collection process, [http://imdb.com/help/show\\_leaf?infosource](http://imdb.com/help/show_leaf?infosource).

Movies were selected for inclusion if they had a known length and had been rated by at least one imdb user. Small categories such as documentaries and NC-17 movies were removed.

### Source

<https://CRAN.R-project.org/package=ggplot2movies>

### Examples

```
dim(movies_wide)
head(movies_wide)
dplyr::glimpse(movies_wide)
```

---

pairwise\_comparisons *Multiple pairwise comparison tests*

---

### Description

Calculate parametric, non-parametric, and robust pairwise comparisons between group levels with corrections for multiple testing.

### Usage

```
pairwise_comparisons(data, x, y, type = "parametric", tr = 0.1,
  paired = FALSE, var.equal = FALSE, p.adjust.method = "holm",
  k = 2, messages = TRUE, ...)
```

```
pairwise_p(data, x, y, type = "parametric", tr = 0.1, paired = FALSE,
  var.equal = FALSE, p.adjust.method = "holm", k = 2,
  messages = TRUE, ...)
```

### Arguments

data	A dataframe (or a tibble) from which variables specified are to be taken. A matrix or tables will <b>not</b> be accepted.
x	The grouping variable from the dataframe data.
y	The response (a.k.a. outcome or dependent) variable from the dataframe data.
type	Type of statistic expected ("parametric" or "nonparametric" or "robust" or "bayes").Corresponding abbreviations are also accepted: "p" (for parametric), "np" (nonparametric), "r" (robust), or "bf" resp.
tr	Trim level for the mean when carrying out robust tests. If you get error stating "Standard error cannot be computed because of Winsorized variance of 0 (e.g., due to ties). Try to decrease the trimming level.", try to play around with the value of tr, which is by default set to 0.1. Lowering the value might help.
paired	Logical that decides whether the experimental design is repeated measures/within-subjects or between-subjects. The default is FALSE.
var.equal	a logical variable indicating whether to treat the two variances as being equal. If TRUE then the pooled variance is used to estimate the variance otherwise the Welch (or Satterthwaite) approximation to the degrees of freedom is used.
p.adjust.method	Adjustment method for $p$ -values for multiple comparisons. Possible methods are: "holm" (default), "hochberg", "hommel", "bonferroni", "BH", "BY", "fdr", "none".
k	Number of digits after decimal point (should be an integer) (Default: k = 2).
messages	Decides whether messages references, notes, and warnings are to be displayed (Default: TRUE).
...	Current ignored.

**Value**

A tibble dataframe containing two columns corresponding to group levels being compared with each other (group1 and group2) and p.value column corresponding to this comparison. The dataframe will also contain a p.value.label column containing a *label* for this *p*-value, in case this needs to be displayed in geom\_ggsignif. In addition to these common columns across the different types of statistics, there will be additional columns specific to the type of test being run.

The significance column will display asterisks to indicate significance of *p*-values in the American Psychological Association (APA) mandated format:

- ns : > 0.05
- \* : < 0.05
- \*\* : < 0.01
- \*\*\* : < 0.001

**Author(s)**

**Indrajeet Patil**

**Examples**

```
# show all columns in a tibble
options(tibble.width = Inf)

#----- between-subjects design -----

# for reproducibility
set.seed(123)

library(pairwiseComparisons)

# parametric
# if `var.equal = TRUE`, then Student's *t*-test will be run
pairwise_comparisons(
  data = ggplot2::msleep,
  x = vore,
  y = brainwt,
  type = "parametric",
  var.equal = TRUE,
  paired = FALSE,
  p.adjust.method = "bonferroni"
)

# if `var.equal = FALSE`, then Games-Howell test will be run
pairwise_comparisons(
  data = ggplot2::msleep,
  x = vore,
  y = brainwt,
  type = "parametric",
  var.equal = FALSE,
```

```

    paired = FALSE,
    p.adjust.method = "bonferroni"
  )

# non-parametric
pairwise_comparisons(
  data = ggplot2::msleep,
  x = vore,
  y = brainwt,
  type = "nonparametric",
  paired = FALSE,
  p.adjust.method = "none"
)

# robust
pairwise_comparisons(
  data = ggplot2::msleep,
  x = vore,
  y = brainwt,
  type = "robust",
  paired = FALSE,
  p.adjust.method = "fdr"
)

#----- within-subjects design -----

# for reproducibility
set.seed(123)

# parametric
pairwise_comparisons(
  data = bugs_long,
  x = condition,
  y = desire,
  type = "parametric",
  paired = TRUE,
  p.adjust.method = "BH"
)

# non-parametric
pairwise_comparisons(
  data = bugs_long,
  x = condition,
  y = desire,
  type = "nonparametric",
  paired = TRUE,
  p.adjust.method = "BY"
)

# robust
pairwise_comparisons(
  data = bugs_long,
  x = condition,

```



```

y = desire,
type = "robust",
paired = TRUE,
p.adjust.method = "hommel"
)

```

---

```
pairwise_comparisons_caption
```

*Preparing caption in case pairwise comparisons are displayed.*

---

### Description

Preparing caption in case pairwise comparisons are displayed.

### Usage

```
pairwise_comparisons_caption(type, var.equal = FALSE, paired = FALSE,
  p.adjust.method = "holm", caption = NULL, ...)
```

```
pairwise_p_caption(type, var.equal = FALSE, paired = FALSE,
  p.adjust.method = "holm", caption = NULL, ...)
```

### Arguments

<code>type</code>	Type of statistic expected ("parametric" or "nonparametric" or "robust" or "bayes").Corresponding abbreviations are also accepted: "p" (for parametric), "np" (nonparametric), "r" (robust), or "bf" resp.
<code>var.equal</code>	a logical variable indicating whether to treat the two variances as being equal. If TRUE then the pooled variance is used to estimate the variance otherwise the Welch (or Satterthwaite) approximation to the degrees of freedom is used.
<code>paired</code>	Logical that decides whether the experimental design is repeated measures/within-subjects or between-subjects. The default is FALSE.
<code>p.adjust.method</code>	Adjustment method for $p$ -values for multiple comparisons. Possible methods are: "holm" (default), "hochberg", "hommel", "bonferroni", "BH", "BY", "fdr", "none".
<code>caption</code>	Text to display as caption (will be displayed on top of the description of pairwise comparison test).
<code>...</code>	Current ignored.

### Value

An expression containing details about the pairwise comparison test carried out. These details are intended to be displayed in the caption of a plot.

**Author(s)**

Indrajeet Patil

**Examples**

```
pairwiseComparisons::pairwise_comparisons_caption(  
  type = "robust",  
  paired = FALSE,  
  p.adjust.method = "holm",  
  caption = "this is caption"  
)
```

---

p\_adjust\_text

*Preparing text to describe which p-value adjustment method was used*

---

**Description**

Preparing text to describe which  $p$ -value adjustment method was used

**Usage**

```
p_adjust_text(p.adjust.method)
```

**Arguments**

p.adjust.method

Adjustment method for  $p$ -values for multiple comparisons. Possible methods are: "holm" (default), "hochberg", "hommel", "bonferroni", "BH", "BY", "fdr", "none".

**Value**

Standardized text description for what method was used.

**Author(s)**

Indrajeet Patil

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