

# Package ‘psychtoolbox’

June 11, 2023

**Title** Tools for psychology research and psychometrics

**Version** 0.0.1

**Description** This package contains functions helping to analyse psychological data.

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**URL** <https://gitlab.com/lukas.novak/psychtoolbox>

**Encoding** UTF-8

**LazyData** true

**Roxygen** list(markdown = TRUE)

**RoxygenNote** 7.2.3

**Imports** coin,  
docextractr,  
dplyr,  
equaltestMI,  
foreign,  
insight,  
lavaan,  
magrittr,  
rmarkdown,  
rstatix,  
stats,  
tidyr,  
expss,  
stringr,  
tidyselect,  
vctrs,  
purrr,  
reshape2,  
janitor,  
broom

**Suggests** testthat (>= 3.0.0)

**Config/testthat/edition** 3

**Depends** R (>= 2.10)

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clin_sig_chang	<i>Clinically significant change</i>
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## Description

This easy function calculates Clinically significant change (clinical cut-off scores) as defined by Jacobson and Truax (1991).

## Usage

```
clin_sig_chang(SD_0, SD_1, M_1, M_0)
```

## Arguments

SD_0	standard deviation of the non-clinical population
SD_1	standard deviation of the clinical population
M_1	mean of the clinical population
M_0	mean of the non-clinical population

## Format

numeric vector of values

## Details

This function computes cut-off score differentiating between the clinical and non-clinical population based on the Jacobson and Truax (1991) formula (p. 13). The mathematical formula can be also found in Biescad & Timulak(2014, p. 150).

## Value

numeric vector

## Author(s)

Lukas Novak, <lukasjirinovak@gmail.com>

## References

Jacobson, N. S., & Truax, P. (1991). Clinical significance: A statistical approach to defining meaningful change in psychotherapy research. *Journal of Consulting and Clinical Psychology*, 59(1), 12-19, DOI: <https://doi.org/10.1037/0022-006X.59.1.12>

Matus Biescad & Ladislav Timulak (2014). Measuring psychotherapy outcomes in routine practice: Examining Slovak versions of three commonly used outcome instruments, *European Journal of Psychotherapy & Counselling*, 16:2, 140-162, DOI: <https://doi.org/10.1080/13642537.2014.895772>

## See Also

[RCI\(\)](#) function for calculation of the Reliable Change Index

## Examples

```
clin.cut.off=clin_sig_chang(SD_0 = 3.5,
                           SD_1 = 2.1,
                           M_0 = 4.2,
                           M_1 = 12.1)

clin.cut.off
```

---

lasy.log.reg

*Lasy logistic regression function*


---

## Description

This function performs logistic regression and print results in tibble output. This function aims to provide the results of the regression analysis in the format, which is frequently desired in academic journals.

## Usage

```
lasy.log.reg(
  independent.var,
  dependent.var,
  print.cov = FALSE,
  covariates = NULL,
  data
)
```

## Arguments

independent.var	independent variable/s
dependent.var	dependent variable/s
print.cov	Print effect of covariates, default is FALSE
covariates	covariates to be included in a model
data	data frame or tibble object

**Format**

An object of class "tibble"

**Details**

Currently, this function does not provide model fit indicators such as AIC or BIC.

**Value**

data frame

**Author(s)**

Lukas Novak, <lukasjirinovak@gmail.com>

**References**

Welch, B. L. (1947). "The generalization of "Student's" problem when several different population variances are involved". *Biometrika*. 34 (1–2): 28–35.

Wilcoxon, F., Individual Comparisons by Ranking Methods, *Biometrics Bulletin*, Vol. 1, 1945, pp. 80–83. DOI:10.2307/3001968

Dunn, O. J. (1961) Multiple comparisons among means. *Journal of the American Statistical Association*. 56, 52–64.

Games, P. A., Keselman, H. J., & Clinch, J. J. Tests for homogeneity of variance in factorial designs. *Psychological Bulletin*, 86, 978–984

**Examples**

```
# data loading
data(paq.validation.study)
regress.output <- lasy.log.reg(independent.var = c("TEQ", "PAQ", "G_EOT", "G_DDF"),
                             covariates = c("Age"),
                             dependent.var = c("econom_stat_dich",
                                                "family_status",
                                                "edu_dich"),
                             data = paq.validation.study)

print(regress.output)
```

---

mitab

---

*Measurement invariance table*


---

**Description**

Measurement invariance table

**Usage**

```
mitab(  
  group1_nam,  
  group2_nam,  
  ordered,  
  model,  
  data,  
  std.lv,  
  meanstructure,  
  group,  
  yes_no_results,  
  estimator,  
  robust = FALSE,  
  cfi.difference = TRUE,  
  rmsea.difference = TRUE  
)
```

**Arguments**

group1_nam	name of the first group
group2_nam	name of the second group
ordered	logical, if set to TRUE items will be treated as ordered variables
model	lavaan model to test
data	data frame or tibble
std.lv	logical, if TRUE than standardized loadings are stored in temporal output
meanstructure	logical, if TRUE than model with meanstructure is estimated
group	name of grouping variable
yes_no_results	logical, if TRUE than lasy output indicating difference between models is added, currently working only based on CFI and RMSEA
estimator	name of estimator to be used during fitting procedure
robust	logical, if TRUE, than robust results are printed, working only with estimators providing robust results (e.g. MLR or DWLS)
cfi.difference	logical, if TRUE, delta of the CFI is printed in output
rmsea.difference	logical, if TRUE, delta of RMSEA is printed in output

**Format**

An object of class "tibble"

**Details**

This function creates table with the key output from measurement invariance testing.

**Value**

data frame

**Author(s)**

Lukas Novak, <lukasjirinovak@gmail.com>

**References**

Myles Hollander and Douglas A. Wolfe (1973). Nonparametric Statistical Methods. New York: John Wiley & Sons. Pages 27–33 (one-sample), 68–75 (two-sample). Or second edition (1999).

**Examples**

```
# The famous Holzinger and Swineford (1939) example
HS.model <- ' visual  =~ x1 + x2 + x3
textual  =~ x4 + x5 + x6
speed    =~ x7 + x8 + x9 '

library(lavaan)
dat <- HolzingerSwineford1939
res.tab.mi <- mitab(
  group1_nam = "Grant-White",
  group2_nam = "Pasteur",
  ordered = FALSE,
  model = HS.model,
  data = dat,
  std.lv = TRUE,
  meanstructure = TRUE,
  group = "school",
  yes_no_results = TRUE,
  estimator = "MLR",
  robust = TRUE,
  cfi.difference = TRUE,
  rmsea.difference = TRUE
)

print(res.tab.mi)
```

---

mult.g.comp

---

*Robust multi-group comparison*


---

**Description**

This function allows to compare multiple groups in multiple outcome variables with violated parametric assumptions.

**Usage**

```
mult.g.comp(df, outcome.var, groups, desc_only = FALSE)
```

**Arguments**

df	data frame or tibble object
outcome.var	continuous variable/s
groups	grouping variable/s
desc_only	print only descriptive statistics, default is FALSE

**Format**

An object of class "tibble"

**Details**

Currently, this function does not report effect size from post-hoc tests.

**Two group comparison:**

If there is less than three groups, the Welch test or the Wilcoxon test depending on data distribution.

**Three and more groups comparison:**

If more than two groups are present in data, the Dunn test or Games-Howell test is performed.

**Value**

data frame

**Author(s)**

Lukas Novak, <lukasjirinovak@gmail.com>

**References**

Welch, B. L. (1947). "The generalization of "Student's" problem when several different population variances are involved". *Biometrika*. 34 (1–2): 28–35.

Wilcoxon, F., Individual Comparisons by Ranking Methods, *Biometrics Bulletin*, Vol. 1, 1945, pp. 80–83. DOI:10.2307/3001968

Dunn, O. J. (1961) Multiple comparisons among means. *Journal of the American Statistical Association*. 56, 52–64.

Games, P. A., Keselman, H. J., & Clinch, J. J. Tests for homogeneity of variance in factorial designs. *Psychological Bulletin*, 86, 978–984

**Examples**

```
# data loading
tab.1=mult.g.comp(df = paq.validation.study, outcome.var = c("PAQ", "G_DIF", "G_DDF", "G_EOT"),
  groups = c("economical_status",
    "Gender",
    "education",
    "family_status"))
# printing the output
print(tab.1)
```

---

paq.validation.study    *paq.validation.study*

---

### Description

This dataset contains data which were used for validation of the Perth Alexithymia Questionnaire in the Czech Republic.

### Usage

paq.validation.study

### Format

A data frame with 848 rows and 53 variables:

P\_DIF double COLUMN\_DESCRIPTION  
 P\_DDF double COLUMN\_DESCRIPTION  
 P\_DAF double COLUMN\_DESCRIPTION  
 N\_DIF double COLUMN\_DESCRIPTION  
 N\_DDF double COLUMN\_DESCRIPTION  
 N\_DAF double COLUMN\_DESCRIPTION  
 G\_EOT double COLUMN\_DESCRIPTION  
 G\_DIF double COLUMN\_DESCRIPTION  
 G\_DDF double COLUMN\_DESCRIPTION  
 G\_DAF double COLUMN\_DESCRIPTION  
 family\_status integer COLUMN\_DESCRIPTION  
 Gender integer COLUMN\_DESCRIPTION  
 TEQ\_1 double COLUMN\_DESCRIPTION  
 TEQ\_3 double COLUMN\_DESCRIPTION  
 TEQ\_5 double COLUMN\_DESCRIPTION  
 TEQ\_16 double COLUMN\_DESCRIPTION  
 TEQ\_CON\_2 double COLUMN\_DESCRIPTION  
 TEQ\_CON\_4 double COLUMN\_DESCRIPTION  
 TEQ\_CON\_14 double COLUMN\_DESCRIPTION  
 TEQ double COLUMN\_DESCRIPTION  
 Age double COLUMN\_DESCRIPTION  
 age\_group double COLUMN\_DESCRIPTION  
 age.quality double COLUMN\_DESCRIPTION  
 ethnicity integer COLUMN\_DESCRIPTION  
 education integer COLUMN\_DESCRIPTION  
 economical\_status integer COLUMN\_DESCRIPTION  
 PAQ\_1 double COLUMN\_DESCRIPTION



```

PAQ_2 double COLUMN_DESCRIPTION
PAQ_3 double COLUMN_DESCRIPTION
PAQ_4 double COLUMN_DESCRIPTION
PAQ_5 double COLUMN_DESCRIPTION
PAQ_6 double COLUMN_DESCRIPTION
PAQ_7 double COLUMN_DESCRIPTION
PAQ_8 double COLUMN_DESCRIPTION
PAQ_9 double COLUMN_DESCRIPTION
PAQ_10 double COLUMN_DESCRIPTION
PAQ_11 double COLUMN_DESCRIPTION
PAQ_12 double COLUMN_DESCRIPTION
PAQ_13 double COLUMN_DESCRIPTION
PAQ_14 double COLUMN_DESCRIPTION
PAQ_15 double COLUMN_DESCRIPTION
PAQ_16 double COLUMN_DESCRIPTION
PAQ_17 double COLUMN_DESCRIPTION
PAQ_18 double COLUMN_DESCRIPTION
PAQ_19 double COLUMN_DESCRIPTION
PAQ_20 double COLUMN_DESCRIPTION
PAQ_21 double COLUMN_DESCRIPTION
PAQ_22 double COLUMN_DESCRIPTION
PAQ_23 double COLUMN_DESCRIPTION
PAQ_24 double COLUMN_DESCRIPTION
PAQ double COLUMN_DESCRIPTION
edu_dich integer COLUMN_DESCRIPTION
econom_stat_dich integer COLUMN_DESCRIPTION

```

### dichotomization of variables

```

paq.validation.study <- paq.validation.study %>% dplyr::mutate(edu_dich = as.factor(ifelse( educa-
tion == "University master or higher", "University", "lower_edu" )), econom_stat_dich = as.factor(ifelse(
economical_status == "Student", "Student", "non_student" )))

```

---

RCI

*Reliable Change Index (RCI)*


---

### Description

This function calculates Reliable Change Index (RCI) as modified by Wiger and Solberg (2001, p.148).

### Usage

```
RCI(SD_0, test.ret.rel)
```

**Arguments**

SD\_0                      standard deviation of the non-clinical population  
test.ret.rel              test-retest reliability of the instrument

**Format**

numeric vector of values

**Details**

This function computes value corresponding to "the minimum amount of change that could not be attributed to the error of measurement" (Biescad & Timulak, 2014, p. 150). If score change from before to post treatment is lower than value resulting from this function, than change in client score can not be attributed to the effectiveness of the therapy but rather other factors such as a measurement error (Biescad & Timulak, 2014). This function is a result of modification of the original Jacobson and Truax (1991) formula by Wiger and Solberg (2001, p.148).

**Value**

numeric vector

**Author(s)**

Lukas Novak, <lukasjirinovak@gmail.com>

**References**

- Jacobson, N. S., & Truax, P. (1991). Clinical significance: A statistical approach to defining meaningful change in psychotherapy research. *Journal of Consulting and Clinical Psychology*, 59(1), 12-19, DOI: <https://doi.org/10.1037/0022-006X.59.1.12>
- Matus Biescad & Ladislav Timulak (2014). Measuring psychotherapy outcomes in routine practice: Examining Slovak versions of three commonly used outcome instruments, *European Journal of Psychotherapy & Counselling*, 16:2, 140-162, DOI: <https://doi.org/10.1080/13642537.2014.895772>
- Wiger, D. E., & Solberg, K. B. (2001). *Tracking Mental Health Outcomes: A Therapist's Guide to Measuring Client Progress, Analyzing Data, and Improving Your Practice* (1., Vol. 2001). Wiley.

**See Also**

[clin\\_sig\\_chang\(\)](#) function for calculation of the clinical cut-off scores

**Examples**

```
re.ch.in = RCI(SD_0 = 4.87, test.ret.rel = 0.66)
re.ch.in
```

---

two.g.comp*Automatic two-groups comparison*

---

**Description**

Automatic two-groups comparison

**Usage**

```
two.g.comp(df, y, group.var)
```

**Arguments**

df	data frame or tibble with one socio-demographic variable and one continuous variable
y	continuous variable
group.var	binary grouping variable

**Format**

An object of class "tibble"

**Details**

This function computes either Wilcoxon test or t-test depending on whether homogeneity of variances assumption is met or not.

**Value**

data frame

**Author(s)**

Lukas Novak, <lukasjirinovak@gmail.com>

**References**

Myles Hollander and Douglas A. Wolfe (1973). Nonparametric Statistical Methods. New York: John Wiley & Sons. Pages 27–33 (one-sample), 68–75 (two-sample). Or second edition (1999).

**Examples**

```
Sex = rbinom(1:100, size = 0:1, prob = .5)
test.dat = data.frame(cbind(Sex), Empathy = ifelse(Sex == 0,
                                                    rnorm(n = 1:100, mean = 50, sd = 10),
                                                    rnorm(n = 1:100, mean = 10, sd = 25)))

# running the function
two.g.comp.out.EC = two.g.comp(df = test.dat, y = "Empathy", group.var = "Sex")
# printing the output
print(two.g.comp.out.EC)
```

---

`word2pdf`*word to pdf*

---

**Description**

Conversion of word document to pdf using either R Markdown package or Libre office. The latter represents higher quality approach - in general.

**Usage**

```
word2pdf(imp_file, out_file)
```

**Arguments**

<code>imp_file</code>	name of the word document to convert - without docx suffix
<code>out_file</code>	name of output pdf file without - without pdf suffix

**Format**

An object of class "pdf"

**Details**

this function is currently running only on windows

**Value**

pdf file

**Author(s)**

Lukas Novak, <lukasjirinovak@gmail.com>

**Examples**

```
# example from word do pdf
#word2pdf(imp_file = "example.docx",out_file = "example1.pdf")
```

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