

Package ‘neuropsychology’

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Type Package

Title Toolbox for Psychologists, Neuropsychologists and
Neuroscientists

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BugReports <https://github.com/neuropsychology/neuropsychology.R/issues>

Description Contains statistical functions (for patient assessment, data preprocessing and reporting, ...) and datasets useful in psychology, neuropsychology and neuroscience.

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Depends R (>= 3.2.0), tidyverse

Imports dplyr, tidyr, ggplot2, lme4, psych, ggcorrplot, Hmisc, MuMIn,
png, tm, wordcloud2, BayesFactor, htmlTable, ppcor, stringi,
caret

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APAze

APA6-ready output for (g)lm , (g)lmer objects and Bayes Factors

Description

APA6-ready output for mixed effects and non-mixed effects linear models.

Usage

```
APAze(fit,
      method="Wald",
      nsim=1000,
      add.stars=TRUE,
      ddf=NULL)
```

Arguments

<code>fit</code>	A (g)lm or lme4::(g)lmer fit.
<code>method</code>	"boot" for bootstrapped CI, "Wald" for estimated. Only in the case of a mixed-effect model. See confint.merMod .
<code>nsim</code>	how many times should it bootstrap the confidence intervals (only if <code>method = "boot"</code>).
<code>add.stars</code>	Add significance stars.

ddf Denominator degrees of freedom approximation (only if fit is an instance of `lmerTest::merModLmerTest`, ignored otherwise). If 'NULL', then the normal approximation (treat t-values as z-values) is used for lmer objects fit with lme4 and the default Satterthwaite is used for models fit with lmerTest.

Author(s)

Dominique Makowski, Phillip Alday

Examples

```
require(neuropsychology)

df <- personality

fit <- lme4::lmer(Age ~ BMI + (1|Salary), data=df)
APAze(fit, method="Wald")
```

ASQ_subjective_mood_disorder

Subjectively reported mood disorder detection based on the ASQ scores.

Description

Returns the probability of subjectively reporting a mood disorder based on scores from the ASQ questionnaire.

Usage

```
ASQ_subjective_mood_disorder(Suppression,
                             Pretending,
                             Feeling_of_Control,
                             Cognitive_Change,
                             Acceptance)
```

Arguments

Suppression The Suppression score (from 0 to 7).
 Pretending The Pretending score (from 0 to 7).
 Feeling_of_Control The Feeling_of_Control score (from 0 to 7).
 Cognitive_Change The Cognitive_Change score (from 0 to 7).
 Acceptance The Acceptance score (from 0 to 7).

Value

prob The probability of subjectively reporting a mood disorder.

Author(s)

Dominique Makowski

Examples

```
require(neuropsychology)
```

```
ASQ_subjective_mood_disorder(4, 2, 1, 4, 3)
```

assess

Compare a given score to a parent population.

Description

Compare a given score to a parent population and draws a plot.

Usage

```
assess(score,
mean=0,
sd=1,
distribution=NA,
language="en",
colour.line="#E91E63",
colour.fill="#2196F3")
```

Arguments

score	The participant's score.
mean	The general population's mean.
sd	The general population's standart deviation.
distribution	Your own vector of parent distribution (if you feed in a vector, it will of course compute new values for the mean and sd).
language	"en" or "fr".
colour.line	The colour of the vertical line.
colour.fill	"The colour of the density plot.

Value

A ggplot2 plot.

Author(s)

Dominique Makowski

Examples

```
require(neuropsychology)

assess(3.4, mean=2.5, sd=1.2)

df <- personality
assess(24, distribution=df$Age)
```

braincloud *Draw a brain shaped wordcloud.*

Description

Draw a brain shaped wordcloud.

Usage

```
braincloud(pdf.file=".",
           words=NULL,
           frequency=NULL,
           word.length.min=4,
           word.length.max=Inf,
           freq.min=10,
           freq.max=Inf,
           image="brain1",
           text.size=0.5,
           colours="neuropsychology",
           colours.replicate=TRUE)
```

Arguments

pdf.file	Either the name of a file (ending with ".pdf"), a directory or nothing to scrap all the PDFs from the directory.
words	A vector of words.
frequency	A length-equal frequency vector.
word.length.min	Keep only words with minimum length x.
word.length.max	Keep only words with maximum length x.
freq.min	Keep only words that appear more than x times.
freq.max	Keep only words that appear less than x times.

`image` NULL or "brain1", "brain2", "head1", "head2".
`text.size` Adjust the text size.
`colours` colour of the words. A vector of HEX colours or the following: "random-dark", "random-light" or "neuropsychology" for a material design palette (default).
`colours.replicate` Should it replicate the length of the colours vector to match the length of the data? If FALSE and length of the colours vector shorter than the length of the data, the words left will appear black.

Value

`cloud` A wordcloud. Better to click on "show in new window" in RStudio.

Author(s)

Dominique Makowski

Examples

```
require(neuropsychology)

braincloud(words=c("here", "is", "some", "random", "words"))
```

`cortable` *Correlation plot and table with significance stars.*

Description

Get a correlation plot and table with significance stars.

Usage

```
cortable(df,
         returns="both",
         correction="holm",
         type="pearson",
         iamaboringperson=FALSE)
```

Arguments

`df` A dataframe.
`returns` "table", "plot" or "both". Returns a table, a ggplot plot or a list with both.
`correction` "none", "holm" for holm-bonferroni (default), "fdr" for False Discovery Rate.
`type` "pearson" for Pearson's, "partial" for partial correlations and "spearman" for Spearman's.
`iamaboringperson` Are you?

Details

'cortable' displays a correlation matrix or table, and a plot. Note that you can save the table under a .csv format to easily integrate it in your documents. Moreover, you can customize the plot's theme and features as it is in ggplot2's format.

Value

result Either The table in the format of a dataframe or the plot in the format of a ggplot's plot. Depending on the "returns" argument.

Author(s)

Dominique Makowski and Bertolt

Examples

```
require(neuropsychology)

df <- personality

cortable(df)

# Extract the table
table <- cortable(df, returns="table")

# Extract the plot
plot <- cortable(df, returns="plot")

# Save table
write.csv(table, "correlation_table.csv")

# Save plot
ggplot2::ggsave("mycorrplot.png", plot)
```

describe *Description of dataframes.*

Description

Describes a numeric vector or numeric columns in a matrix or dataframe.

Usage

```
describe(df)
```

Arguments

df A dataframe, matrix or vector.

Details

'describe' displays a table of descriptive statistics for numeric variables in the object 'df'. This function is just a wrapper for the psych::describe function. All credits go to its authors. Note that it selects only numeric variables.

Value

df The summary dataframe.

Author(s)

Dominique Makowski

Examples

```
require(neuropsychology)

df <- personality

describe(df)
```

dprime *Calculates Signal Detection Theory indices.*

Description

Calculates the d' , the beta, the A' and the $B''D$ based on the signal detection theory (SRT). See Pallier (2002) for the algorithms.

Usage

```
dprime(n_hit, n_miss, n_fa, n_cr)
```

Arguments

n_hit	Number of hits.
n_miss	Number of misses.
n_fa	Number of false alarms.
n_cr	Number of correct rejections.

Details

For d' and beta, adjustment for extreme values are made following the recommendations Hautus (1995).

Value

A list containing 4 objects.

dprime	The d'. d' reflects the distance between the two distributions: signal, and signal+noise and corresponds to the Z value of the hit-rate minus that of the false-alarm rate.
beta	The beta. The value for beta is the ratio of the normal density functions at the criterion of the Z values used in the computation of d'. This reflects an observer's bias to say 'yes' or 'no' with the unbiased observer having a value around 1.0. As the bias to say 'yes' increases, resulting in a higher hit-rate and false-alarm-rate, beta approaches 0.0. As the bias to say 'no' increases, resulting in a lower hit-rate and false-alarm rate, beta increases over 1.0 on an open-ended scale.
aprime	The A'. Non-parametric estimate of discriminability. An A' near 1.0 indicates good discriminability, while a value near 0.5 means chance performance.
bppd	The B'D. Non-parametric estimate of bias. A B'D equal to 0.0 indicates no bias, positive numbers represent conservative bias (i.e. a tendency to answer 'no'), negative numbers represent liberal bias (i.e. a tendency to answer 'yes'). The maximum absolute value is 1.0.
c	The Criterion. the number of standard deviations from the midpoint between these two distributions, i.e. a measure on a continuum from "conservative" to "liberal".

Examples

```
n_hit <- 9
n_miss <- 1
n_fa <- 2
n_cr <- 7

indices <- dprime(n_hit, n_miss, n_fa, n_cr)
```

extract_text

Extract text from PDFs.

Description

Scrap text from PDFs.

Usage

```
extract_text(files=".",
             word.length.min=4,
             word.length.max=Inf,
             freq.min=10,
             freq.max=Inf)
```

Arguments

files	Either the name of a file (ending with ".pdf"), a directory or nothing to scrap all the PDFs from the directory.
word.length.min	Keep only words with minimum length x.
word.length.max	Keep only words with maximum length x.
freq.min	Keep only words that appear more than x times.
freq.max	Keep only words that appear less than x times.

Value

data	A dataframe containing two columns for words and their frequency.
------	---

Author(s)

Dominique Makowski

Examples

```
require(neuropsychology)

# text <- extract_text() # In a folder containg some PDFs.
```

fa_loadings *Format the loadings of a factor analysis.*

Description

Format the loadings of a factor analysis.

Usage

```
fa_loadings(fa,
            treshold=0,
            round=2,
            labels=NA)
```

Arguments

fa	An object returned by the psych::fa function.
treshold	Remove loadings inferior to a treshold.
round	Round the final loadings matrix.
labels	Supply a additional column with e.g. item labels

Value

list with two elements.

full The full loadings dataframe.
max The max loading of each item.

Author(s)

Dominique Makowski

Examples

```
require(neuropsychology)
require(psych)

df <- select_numeric(personality)
fa <- psych::fa(df)

fa_loadings(fa)$max
```

format_p	<i>Format the p value using APA6 standards.</i>
----------	---

Description

Format the p value using APA6 standards.

Usage

```
format_p(p,
         add.stars=TRUE)
```

Arguments

p The p value.
add.stars Should it add significance stars at the end.

Value

p The formatted value.

Author(s)

Dominique Makowski

Examples

```
require(neuropsychology)

format_p(0.07)
```

interpret

Interpretation help for AIC and BIC.

Description

Interpretation help for AIC and BIC.

Usage

```
interpret(value,  
          what="BIC")
```

Arguments

value	A value.
what	"AIC" or "BIC".

Value

list list containing the interpretation and the source.

Author(s)

Dominique Makowski

Examples

```
require(neuropsychology)  
interpret(7.2, what="BIC")
```

masks

The masks used in textcloud

Description

A list of masks used in textcloud.

Author(s)

Dominique Makowski

models	<i>Models of machine learning.</i>
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Description

A list of models of machine learning.

Author(s)

Dominique Makowski

n_colours	<i>Returns a vector of colours</i>
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Description

Returns a vector of colours based on the material design palette.

Usage

```
n_colours(colours="all")
```

Arguments

colours c("all", "blues", "reds", "yellows", "greys"). The colours list to return.

Value

n_colours A vector of colours in HEX format.

Author(s)

Dominique Makowski

Examples

```
require(neuropsychology)

mypalette <- n_colours("blues")
```

odds_to_probs	<i>Odds to probabilities transformation.</i>
---------------	--

Description

STransform odds or log odds to probabilities.

Usage

```
odds_to_probs(odds, log=TRUE)
```

Arguments

odds	The odds.
log	Are these log odds?

Author(s)

Dominique Makowski

Examples

```
require(neuropsychology)
```

```
odds_to_probs(0.46)
```

personality	<i>A dataframe with personality data</i>
-------------	--

Description

A dataset containing normal and pathological personality traits data from an online questionnaire.

If you use this dataset for a publication, please refer to it as: "personality-1.0".

Demographic variables:

– Study_Level

The level of education. Should be treated as a factor. 0: Absence of Degree, 1: Secondary Education Degree, 2: Youth Training, 3: High-school Degree, 4: Higher National Diploma (2 years of higher education), 5: Bachelor Degree (3 years of higher education), 6: Master Degree (5 years of higher education), 7: Doctorate Degree (8 years of higher education)

Format

1327 observations (rows) and 20 variables (columns)

Author(s)

Dominique Makowski

Examples

```
require(neuropsychology)
df <- personality
describe(df)
```

`select_factors` *Subset a dataframe by keeping the factors.*

Description

Subset a dataframe by keeping the factors.

Usage

```
select_factors(df)
```

Arguments

`df` A Data frame.

Author(s)

Dominique Makowski

Examples

```
require(neuropsychology)
df <- personality
df_only_factors <- select_factors(df)
```

`select_numeric` *Subset a dataframe by keeping the numeric variables.*

Description

Subset a dataframe by keeping the numeric variables.

Usage

```
select_numeric(df)
```

Arguments

`df` A Data frame.

Author(s)

Dominique Makowski

Examples

```
require(neuropsychology)

df <- personality

df_only_numeric <- select_numeric(df)
```

`specific_correlations` *Correlations Pairs According to Condition*

Description

Get pairs of correlations according to a specific condition.

Usage

```
specific_correlations(cor, treshold=0.95, upper=TRUE, labels=NA)
```

Arguments

`cor` Correlation matrix.
`treshold` A treshold.
`upper` Higher than the treshold if TRUE, lower if FALSE.
`labels` Vector of additional infos about the items (such as the title).

Value

pairs A dataframe.

Author(s)

Dominique Makowski

Examples

```
require(neuropsychology)

cor <- cor(na.omit(select_numeric(personality)))
specific_correlations(cor, threshold=0.2)
```

theme_neuropsychology *A minimal theme for ggplot2.*

Description

A minimal theme for ggplot2.

Usage

```
theme_neuropsychology(legend.position="right",
                      legend.text.size=20,
                      axis.title.size=20,
                      axis.text.size=15)
```

Arguments

legend.position One of the following: "right", "left", "top" or "bottom".

legend.text.size The size of the legend text (usually the numbers).

axis.title.size The size of the legend title.

axis.text.size The size of the axis titles.

Details

For an even better result, don't forget to change the colour palette and to add a space between the axis title and the axis (see the example below).

Author(s)

Dominique Makowski

Examples

```
require(ggplot2)
require(neuropsychology)

df <- personality

ggplot(df, aes(x=Age, y=Negative_Affect, colour=Sex, fill=Sex)) +
  geom_point() +
  geom_smooth(method="lm", fullrange=TRUE) +

  theme_neuropsychology() +

  xlab("\nAge") +
  ylab("Negative Affect\n") +
  scale_fill_brewer(palette="Set1",direction=-1) +
  scale_colour_brewer(palette="Set1",direction=-1)
```

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