

Package ‘circumplex’

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Type Package

Title Analysis and Visualization of Circular Data

Version 0.2.0

Description Tools for analyzing and visualizing circular data, including scoring functions for relevant instruments and a generalization of the bootstrapped structural summary method from Zimmermann & Wright (2017) <doi:10.1177/1073191115621795> and functions for creating publication-ready tables and figures from the results. Future versions will include tools for circular fit and reliability analyses, as well as visualization enhancements.

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URL <https://github.com/jmgirard/circumplex>

BugReports <https://github.com/jmgirard/circumplex/issues>

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Author Jeffrey Girard [aut, cre] (<<https://orcid.org/0000-0002-7359-3746>>), Johannes Zimmermann [aut] (<<https://orcid.org/0000-0001-6975-2356>>), Aidan Wright [aut] (<<https://orcid.org/0000-0002-2369-0601>>)

Maintainer Jeffrey Girard <me@jmgirard.com>

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circumplex-package *Analysis and visualization of circumplex data*

Description

circumplex provides functions for analyzing and visualizing circumplex data.

Details

Its goal is to unify, modernize, and extend existing methods of working with circumplex data. Its functions share an underlying design philosophy and grammar. The three guiding principles it aspires to are:

- **Accessibility:** zero cost, open source, libre; works on many platforms; easy to use across skill levels
- **Flexibility:** customizable by the user; extendable for other uses; plays nicely with other packages
- **Consistency:** unit-tested quality control; firm naming conventions; data flows between functions

To learn more about circumplex, start with the vignettes: `browseVignettes(package = "circumplex")`

Author(s)

Maintainer: Jeffrey Girard <me@jmgirard.com> (0000-0002-7359-3746)

Authors:

- Johannes Zimmermann (0000-0001-6975-2356)
- Aidan Wright (0000-0002-2369-0601)

See Also

Useful links:

- <https://github.com/jmgirard/circumplex>
- Report bugs at <https://github.com/jmgirard/circumplex/issues>

anchors

Display the anchors of a circumplex instrument

Description

Display the anchors of a circumplex instrument including the total number of anchors and each anchor's numerical value and text label. Anchors are the response options that respondents select from (e.g., 0 = No, 1 = Yes).

Usage

```
anchors(x)
```

Arguments

x Required. An object of the instrument class.

Value

The same input object. Prints text to console.

See Also

Other instrument functions: [instruments](#), [instrument](#), [items](#), [norms](#), [scales](#)

Examples

```
instrument(csip)
anchors(csip)
```

aw2009

Standardized octant scores on hypothetical circumplex scales

Description

A small example dataset containing standardized scores on eight hypothetical circumplex scales. Taken from Wright, Pincus, Conroy, & Hilsenroth (2009).

Usage

```
aw2009
```

Format

A data frame with 5 observations and 8 variables:

PA circumplex scale at 90 degrees

BC circumplex scale at 135 degrees

DE circumplex scale at 180 degrees

FG circumplex scale at 225 degrees

HI circumplex scale at 270 degrees

JK circumplex scale at 315 degrees

LM circumplex scale at 360 degrees

NO circumplex scale at 45 degrees

Source

<https://doi.org/10.1080/00223890902935696>

csie

Circumplex Scales of Interpersonal Efficacy

Description

Information about the Circumplex Scales of Interpersonal Efficacy.

Usage

csie

Format

An object of class instrument of length 5.

Source

<https://www.webpages.uidaho.edu/klocke/csie.htm>

Examples

```
instrument("csie")
summary(csie)
```

csig

Circumplex Scales of Intergroup Goals

Description

Information about the Circumplex Scales of Intergroup Goals.

Usage

csig

Format

An object of class instrument of length 5.

Source

<https://www.webpages.uidaho.edu/klocke/csig.htm>

Examples

```
instrument("csig")
summary(csig)
```

csip

Circumplex Scales of Interpersonal Problems

Description

Information about the Circumplex Scales of Interpersonal Problems.

Usage

csip

Format

An object of class instrument of length 5.

Source

<https://doi.org/10.1037/pas0000505>

Examples

```
instrument("csip")
summary(csip)
```

csiv

Circumplex Scales of Interpersonal Values

Description

Information about the Circumplex Scales of Interpersonal Values.

Usage

csiv

Format

An object of class instrument of length 5.

Source

<https://www.webpages.uidaho.edu/klocke/csiv.htm>

Examples

```
instrument("csiv")
summary(csiv)
```

html_render	<i>Format and render data frame as HTML table</i>
-------------	---

Description

Format a data frame as an HTML table and render it to the web viewer.

Usage

```
html_render(df, caption = NULL, align = "l", ...)
```

Arguments

df	A data frame to be rendered as an HTML table.
caption	A string to be displayed above the table.
align	A string indicating the alignment of the cells (default = "l").
...	Other arguments to pass to <code>htmlTable</code> .

Value

HTML syntax for the df table.

See Also

Other table functions: [ssm_append](#), [ssm_table](#)

igicr	<i>Interpersonal Goals Inventory for Children, Revised Version</i>
-------	--

Description

Information about the Interpersonal Goals Inventory for Children, Revised Version.

Usage

```
igicr
```

Format

An object of class `instrument` of length 5.

Source

<https://doi.org/10.1177/1073191111411672>

Examples

```
instrument("igicr")  
summary(igicr)
```

iip32

Inventory of Interpersonal Problems, Brief Version

Description

Information about the Inventory of Interpersonal Problems, Brief Version. Note that, although we have permission to provide some information about the IIP-32, Mind Garden Inc. has exclusive rights to distribute it in full.

Usage

```
iip32
```

Format

An object of class instrument of length 5.

Source

<https://www.mindgarden.com/113-inventory-of-interpersonal-problems>

Examples

```
instrument("iip32")  
summary(iip32)
```

iip64

Inventory of Interpersonal Problems

Description

Information about the Inventory of Interpersonal Problems. Note that, although we have permission to provide some information about the IIP-64, Mind Garden Inc. has exclusive rights to distribute it in full.

Usage

```
iip64
```

Format

An object of class instrument of length 5.

Source

<https://www.mindgarden.com/113-inventory-of-interpersonal-problems>

Examples

```
instrument("iip64")
summary(iip64)
```

iipsc

Inventory of Interpersonal Problems, Short Circumplex

Description

Information about the Inventory of Interpersonal Problems Short Circumplex.

Usage

```
iipsc
```

Format

An object of class instrument of length 5.

Source

<https://doi.org/10.1080/00223890802388665>

Examples

```
instrument("iipsc")
summary(iipsc)
```

iis32

Inventory of Interpersonal Strengths, Brief Version

Description

Information about the Inventory of Interpersonal Strengths, Brief Version.

Usage

```
iis32
```

Format

An object of class instrument of length 5.

Source

<https://doi.org/10.1080/00223891.2012.681818>

Examples

```
instrument("iis32")
summary(iis32)
```

iis64

Inventory of Interpersonal Strengths

Description

Information about the Inventory of Interpersonal Strengths.

Usage

```
iis64
```

Format

An object of class instrument of length 5.

Source

<https://doi.org/10.1037/a0017269>

Examples

```
instrument("iis64")
summary(iis64)
```

instrument

Load a specific instrument object

Description

The circumplex package includes information about numerous circumplex instruments including instructions for scoring and standardizing items to be used in conjunction with the score and standardize functions. This function loads the information for a specific instrument into memory. See the instruments function to list all available instruments.

Usage

```
instrument(code)
```

Arguments

code Required. A string (e.g., "iip32") or text in non-standard evaluation (e.g., iip32). The code of the instrument assigned by this package and displayed in parentheses by `instruments()`.

Value

The instrument object for the requested circumplex instrument. If the function is called without a name assignment (LHS), then the object will be created in the global environment with the default name as above. Or, if a name is assigned (LHS), the object will have that name instead.

See Also

Other instrument functions: [anchors](#), [instruments](#), [items](#), [norms](#), [scales](#)

Examples

```
instrument(iip32)
instrument("iip32")
x <- instrument(iip32)
```

instruments

List all available instruments

Description

The circumplex package includes information about numerous circumplex instruments including instructions for scoring and standardizing items. Individual instruments can be loaded using the `instrument` function.

Usage

```
instruments()
```

See Also

Other instrument functions: [anchors](#), [instrument](#), [items](#), [norms](#), [scales](#)

Examples

```
instruments()
```

ipipipc	<i>IPIP Interpersonal Circumplex</i>
---------	--------------------------------------

Description

Information about the IPIP Interpersonal Circumplex.

Usage

```
ipipipc
```

Format

An object of class instrument of length 5.

Source

<https://doi.org/10.1177/1073191109340382>

Examples

```
instrument("ipipipc")
summary(ipipipc)
```

ipsatize	<i>Ipsatize circumplex items using deviation scoring across variables</i>
----------	---

Description

Rescore each circumplex item using deviation scoring across variables. In other words, subtract each observation's mean response from each response. This effectively removes the presence of a general factor, which can make certain circumplex fit analyses more powerful.

Usage

```
ipsatize(.data, items, na.rm = TRUE, overwrite = FALSE)
```

Arguments

.data	Required. A data frame containing at least circumplex scales.
items	Required. The variable names or column numbers for the variables in .data that contain circumplex items to be ipsatized.
na.rm	Optional. A logical that determines whether missing values should be ignored during the calculation of the mean during ipsatization (default = TRUE).
overwrite	Optional. A logical that determines whether the variables specified in items should be overwritten with ipsatized versions or alternatively preserved and new variables ending with "_i" should be added to the data frame (default = FALSE).

Value

A data frame that matches `.data` except that the variables specified in `items` have been rescored using ipsatization.

See Also

Other tidying functions: [score](#), [standardize](#)

Examples

```
data("raw_iipsc")
ipsatize(raw_iipsc, IIP01:IIP32)
```

isc

Interpersonal Sensitivities Circumplex

Description

Information about the Interpersonal Sensitivities Circumplex.

Usage

```
isc
```

Format

An object of class `instrument` of length 5.

Source

<https://doi.org/10.1111/j.1467-6494.2011.00696.x>

Examples

```
instrument("isc")
summary(isc)
```

`items`*Display the items of a circumplex instrument*

Description

Display the items of a circumplex instrument including the total number of items and each item's number and text. The item ordering/numbering displayed here is the same ordering/numbering assumed by the `score()` function.

Usage

```
items(x)
```

Arguments

`x` Required. An object of the instrument class.

Value

The same input object. Prints text to console.

See Also

Other instrument functions: [anchors](#), [instruments](#), [instrument](#), [norms](#), [scales](#)

Examples

```
instrument(csip)
items(csip)
```

`jz2017`*Raw octant scores on real circumplex scales with covariates*

Description

A large example dataset containing gender, raw mean scores on the Inventory of Interpersonal Problems - Short Circumplex (IIP-SC), and raw sum scores on the Personality Diagnostic Questionnaire - 4th Edition Plus (PDQ-4+).

Usage

```
jz2017
```

Format

A data frame with 1166 observations and 19 variables:

Gender Self-reported Gender
PA Domineering Problems (IIP-SC) 90 degrees
BC Vindictive Problems (IIP-SC) 135 degrees
DE Cold Problems (IIP-SC) 180 degrees
FG Socially Avoidant Problems (IIP-SC) 225 degrees
HI Nonassertive Problems(IIP-SC) 270 degrees
JK Easily Exploited Problems (IIP-SC) 315 degrees
LM Overly Nurturant Problems (IIP-SC) 360 degrees
NO Intrusive Problems (IIP-SC) 45 degrees
PARPD Paranoid PD Symptoms (PDQ-4+)
SCZPD Schizoid PD Symptoms (PDQ-4+)
SZTPD Schizotypal PD Symptoms (PDQ-4+)
ASPD Antisocial PD Symptoms (PDQ-4+)
BORPD Borderline PD Symptoms (PDQ-4+)
HISPD Histrionic PD Symptoms (PDQ-4+)
NARPD Narcissistic PD Symptoms (PDQ-4+)
AVPD Avoidant PD Symptoms (PDQ-4+)
DPNPD Dependent PD Symptoms (PDQ-4+)
OCPD Obsessive-Compulsive PD Symptoms (PDQ-4+)

Source

<https://doi.org/10.1177/1073191115621795>

norms

Display the norms for a circumplex instrument

Description

Display the norms for a circumplex instrument including the total number of normative data sets available and each data set's number, sample size, population, and source reference and hyperlink. If another normative data set exists that is not yet included in the package, please let us know.

Usage

norms(x)

Arguments

x Required. An object of the instrument class.

Value

The same input object. Prints text to console.

See Also

Other instrument functions: [anchors](#), [instruments](#), [instrument](#), [items](#), [scales](#)

Examples

```
instrument(csip)
norms(csip)
```

octants

Angular displacements for octant circumplex scales

Description

Return a vector of angular displacements, in degrees, for eight equally spaced circumplex scales corresponding to the circumplex octants. Can be passed to the `angles` parameter of other functions in this package.

Usage

```
octants()
```

Value

A numeric vector with eight elements, each corresponding to the angular displacement (in degrees) of a subscale, in the following order: PA, BC, DE, FG, HI, JK, LM, NO.

Examples

```
octants()
```

poles

Angular displacements for pole circumplex scales

Description

Return a vector of angular displacements, in degrees, for four equally spaced circumplex scales corresponding to the circumplex poles. Can be passed to the `angles` parameter of other functions in this package.

Usage

```
poles()
```

Value

A numeric vector with four elements, each corresponding to the angular displacement (in degrees) of a subscale, in the following order: PA, DE, HI, LM.

Examples

```
poles()
```

quadrants

Angular displacements for quadrant circumplex scales

Description

Return a vector of angular displacements, in degrees, for four equally spaced circumplex scales corresponding to the circumplex quadrants. Can be passed to the `angles` parameter of other functions in this package.

Usage

```
quadrants()
```

Value

A numeric vector with eight elements, each corresponding to the angular displacement (in degrees) of a subscale, in the following order: BC, FG, JK, NO.

Examples

```
quadrants()
```

raw_iipsc	<i>Raw item responses on real circumplex scales</i>
-----------	---

Description

A small example dataset containing raw item responses on the Inventory of Interpersonal Problems, Short Circumplex (IIP-SC). This data set is useful for testing functions that operate on item-level data.

Usage

```
raw_iipsc
```

Format

A data frame with 10 observations and 32 variables.

scales	<i>Display the scales of a circumplex instrument</i>
--------	--

Description

Display the scales of a circumplex instrument including the total number of scales and each scale's abbreviation, hypothetical angle, and text label.

Usage

```
scales(x, items = FALSE)
```

Arguments

x	Required. An object of the instrument class.
items	Optional. A logical determining whether the items for each scale should be displayed below its other information (default = FALSE).

Value

The same input object. Prints text to console.

See Also

Other instrument functions: [anchors](#), [instruments](#), [instrument](#), [items](#), [norms](#)

Examples

```
instrument(csip)
scales(csip)
scales(csip, items = TRUE)
```

score	<i>Score circumplex scales from item responses</i>
-------	--

Description

Calculate mean scores on circumplex scales from item responses by using a set of scoring instructions, which may be loaded from the package or created as a custom data frame.

Usage

```
score(.data, items, instrument, na.rm = TRUE, prefix = "",
      suffix = "")
```

Arguments

<code>.data</code>	Required. A data frame containing at least circumplex scales.
<code>items</code>	Required. The variable names or column numbers for the variables in <code>.data</code> that contain all the circumplex items from a single circumplex measure, in ascending order from item 1 to item N.
<code>instrument</code>	Required. An instrument object from the package. To see the available circumplex instruments, use <code>instruments()</code> .
<code>na.rm</code>	Optional. A logical that determines if missing values should be omitted from the calculation of scores (default = TRUE). When set to TRUE, scales with missing data are essentially calculated with mean imputation.
<code>prefix</code>	Optional. A string to include at the beginning of the newly calculated scale variables' names, before <code>Abbrev</code> from <code>key</code> and <code>suffix</code> (default = "").
<code>suffix</code>	Optional. A string to include at the end of the newly calculated scale variables' names, after <code>Abbrev</code> from <code>key</code> and <code>prefix</code> (default = "").

Value

A data frame that matches `.data` except that new variables are appended that contain mean scores on each variable included in `key`.

See Also

Other tidying functions: [ipsatize](#), [standardize](#)

Examples

```
data("raw_iipsc")
instrument("iipsc")
score(raw_iipsc, IIP01:IIP32, iipsc)
```

 ssm_analyze

Perform analyses using the Structural Summary Method

Description

Calculate SSM parameters with bootstrapped confidence intervals for a variety of different analysis types. Depending on what arguments are supplied, either mean-based or correlation-based analyses will be performed, one or more groups will be used to stratify the data, and contrasts between groups or measures will be calculated.

Usage

```
ssm_analyze(.data, scales, angles, measures = NULL, grouping = NULL,
  contrast = "none", boots = 2000, interval = 0.95,
  listwise = TRUE)
```

Arguments

.data	Required. A data frame containing at least circumplex scales.
scales	Required. The variable names or column numbers for the variables in .data that contain circumplex scales to be analyzed.
angles	Required. A numeric vector containing the angular displacement of each circumplex scale included in scales (in degrees).
measures	Optional. The variable names or column numbers for one or more variables in .data to be correlated with the circumplex scales and analyzed using correlation-based SSM analyses. To analyze the circumplex scales using mean-based analyses, simply omit this argument or set it to NULL (default = NULL).
grouping	Optional. The variable name or column number for the variable in .data that indicates the group membership of each observation. To analyze all observations in a single group, simply omit this argument or set it to NULL (default = NULL).
contrast	Optional. A string indicating what type of contrast to run. Current options are "none" for no contrast, "model" to find SSM parameters for the difference scores, or "test" to find the difference between the SSM parameters. Note that only two groups or measures can be contrasted at a time (default = "none").
boots	Optional. A single positive integer indicating how many bootstrap resamples to use when estimating the confidence intervals (default = 2000).
interval	Optional. A single positive number between 0 and 1 (exclusive) that indicates what confidence level to use when estimating the confidence intervals (default = 0.95).
listwise	Optional. A logical indicating whether missing values should be handled by listwise deletion (TRUE) or pairwise deletion (FALSE). Note that pairwise deletion may result in different missing data patterns in each bootstrap resample and is slower to compute (default = TRUE).

Value

A list containing the results and description of the analysis.

results	A tibble with the SSM parameter estimates
details	A list with the number of bootstrap resamples (boots), the confidence interval percentage level (interval), and the angular displacement of scales (angles)
call	A language object containing the function call that created this object
scores	A tibble containing the mean scale scores
type	A string indicating what type of SSM analysis was done

See Also

Other ssm functions: [ssm_append](#), [ssm_plot](#), [ssm_table](#)

Examples

```
# Load example data
data("jz2017")

# Single-group mean-based SSM
ssm_analyze(jz2017, scales = PA:NO, angles = octants())

# Single-group correlation-based SSM
ssm_analyze(jz2017, scales = PA:NO, angles = octants(),
  measures = c(NARPD, ASPD))

# Multiple-group mean-based SSM
ssm_analyze(jz2017, scales = PA:NO, angles = octants(), grouping = Gender)

# Multiple-group mean-based SSM with contrast
ssm_analyze(jz2017, scales = PA:NO, angles = octants(), grouping = Gender,
  contrast = "model")

# Single-group correlation-based SSM with contrast
ssm_analyze(jz2017, scales = PA:NO, angles = octants(),
  measures = c(NARPD, ASPD), contrast = "test")

# Multiple-group correlation-based SSM
ssm_analyze(jz2017, scales = PA:NO, angles = octants(), measures = NARPD,
  grouping = Gender)

# Multiple-group correlation-based SSM with contrast
ssm_analyze(jz2017, scales = PA:NO, angles = octants(), measures = NARPD,
  grouping = Gender, contrast = "test")
```

`ssm_append`*Combine SSM tables*

Description

Combine SSM tables by appending them as rows.

Usage

```
ssm_append(.ssm_table, ..., caption = NULL, render = TRUE)
```

Arguments

<code>.ssm_table</code>	A data frame from the <code>ssm_table()</code> function to be the first row(s) of the combined table.
<code>...</code>	One or more additional data frames from the <code>ssm_table()</code> function to be appended to <code>.ssm_table</code> in the order of input.
<code>caption</code>	A string to be displayed above the table if rendered.
<code>render</code>	A logical indicating whether the table should be displayed in the RStudio viewer or web browser (default = TRUE).

Value

A tibble containing the information for the HTML table. As a side-effect, may also output the HTML table to the web viewer.

See Also

Other ssm functions: [ssm_analyze](#), [ssm_plot](#), [ssm_table](#)

Other table functions: [html_render](#), [ssm_table](#)

Examples

```
data("jz2017")
res1 <- ssm_analyze(jz2017, PA:NO, octants())
res2 <- ssm_analyze(jz2017, PA:NO, octants(), grouping = Gender)
tab1 <- ssm_table(res1, render = FALSE)
tab2 <- ssm_table(res2, render = FALSE)
ssm_append(tab1, tab2)
```

`ssm_plot`*Create a figure from SSM results*

Description

Take in the results of an SSM analysis function and create figure from it.

Usage

```
ssm_plot(.ssm_object, fontsize = 12, ...)
```

Arguments

<code>.ssm_object</code>	Required. The results output of ssm_analyze .
<code>fontsize</code>	Optional. A single positive number indicating the font size of text in the figure, in points (default = 12).
<code>...</code>	Additional arguments to pass on to the plotting function.

Value

A `ggplot2` object representing the figure

See Also

[ggsave](#) Function for saving plots to image files.

Other `ssm` functions: [ssm_analyze](#), [ssm_append](#), [ssm_table](#)

Examples

```
# Load example data
data("jz2017")

# Plot profile results
res <- ssm_analyze(jz2017, scales = PA:NO, angles = octants(),
  measures = c(NARPD, ASPD))
p <- ssm_plot(res)

# Plot contrast results
res <- ssm_analyze(jz2017, scales = PA:NO, angles = octants(),
  measures = c(NARPD, ASPD), contrast = "test")
p <- ssm_plot(res)
```

ssm_plot_circle *Create a Circular Plot of SSM Results*

Description

Take in the results of a Structural Summary Method analysis and plot the point and interval estimate for each row (e.g., group or measure) in a circular space quantified by displacement and amplitude.

Usage

```
ssm_plot_circle(.ssm_object, amax = NULL, fontsize = 12,
               lowfit = TRUE)
```

Arguments

.ssm_object	The output of ssm_profiles() or ssm_measures().
amax	A positive real number corresponding to the radius of the circle. It is used to scale the amplitude values and will determine which amplitude labels are drawn.
fontsize	A positive real number corresponding to the size (in pt) of the text labels (default = 12).
lowfit	A logical determining whether profiles with low model fit (<.70) should be plotted, with dashed borders (default = TRUE).

Value

A ggplot variable containing a completed circular plot.

ssm_plot_contrast *Create a Difference Plot of SSM Contrast Results*

Description

Take in the results of a Structural Summary Method analysis with pairwise contrasts and plot the point and interval estimates for each parameter's contrast (e.g., between groups or measures).

Usage

```
ssm_plot_contrast(.ssm_object, axislabel = "Difference", xy = TRUE,
                 color = "red", linesize = 1.25, fontsize = 12)
```


Arguments

.ssm_object	Required. The results output of <code>ssm_analyze</code> .
axislabel	Optional. A string to label the y-axis (default = "Difference").
xy	A logical determining whether the X-Value and Y-Value parameters should be included in the plot (default = TRUE).
color	Optional. A string corresponding to the color of the point range (default = "red").
linesize	Optional. A positive number corresponding to the size of the point range elements in mm (default = 1.5).
fontsize	Optional. A positive number corresponding to the size of the axis labels, numbers, and facet headings in pt (default = 12).

Value

A ggplot variable containing difference point-ranges faceted by SSM parameter. An interval that does not contain the value of zero has $p < .05$.

ssm_table	<i>Create HTML table from SSM results or contrasts</i>
-----------	--

Description

Take in the results of an SSM analysis and return an HTML table with the desired formatting.

Usage

```
ssm_table(.ssm_object, caption = NULL, xy = TRUE, render = TRUE)
```

Arguments

.ssm_object	The output of <code>ssm_profiles()</code> or <code>ssm_measures()</code>
caption	A string to be displayed above the table (default = NULL).
xy	A logical indicating whether the x-value and y-value parameters should be included in the table as columns (default = TRUE).
render	A logical indicating whether the table should be displayed in the RStudio viewer or web browser (default = TRUE).

Value

A tibble containing the information for the HTML table. As a side-effect, may also output the HTML table to the web viewer.

See Also

Other ssm functions: [ssm_analyze](#), [ssm_append](#), [ssm_plot](#)

Other table functions: [html_render](#), [ssm_append](#)

Examples

```
# Load example data
data("jz2017")

# Create table of profile results
res <- ssm_analyze(jz2017, scales = PA:NO, angles = octants(),
  measures = c(NARPD, ASPD))
ssm_table(res)

# Create table of contrast results
res <- ssm_analyze(jz2017, scales = PA:NO, angles = octants(),
  measures = c(NARPD, ASPD), contrast = "test")
ssm_table(res)
```

standardize

Standardize circumplex scales using normative data

Description

Take in a data frame containing circumplex scales, angle definitions for each scale, and normative data (from the package or custom) and return that same data frame with each specified circumplex scale transformed into standard scores (i.e., z-scores) based on comparison to the normative data.

Usage

```
standardize(.data, scales, angles, instrument, sample = 1, prefix = "",
  suffix = "_z")
```

Arguments

<code>.data</code>	Required. A data frame containing at least circumplex scales.
<code>scales</code>	Required. The variable names or column numbers for the variables in <code>.data</code> that contain circumplex scales to be standardized.
<code>angles</code>	Required. A numeric vector containing the angular displacement of each circumplex scale included in <code>scales</code> (in degrees).
<code>instrument</code>	Required. An instrument object from the package. To see the available circumplex instruments, see <code>instruments()</code> .
<code>sample</code>	Required. An integer corresponding to the normative sample to use in standardizing the scale scores (default = 1). See <code>?norms</code> to see the normative samples available for an instrument.
<code>prefix</code>	Optional. A string to include at the beginning of the newly calculated scale variables' names, before the scale name and <code>suffix</code> (default = "").
<code>suffix</code>	Optional. A string to include at the end of the newly calculated scale variables' names, after the scale name and <code>prefix</code> (default = "_z").

Value

A data frame that matches `.data` except that new variables are appended that contain standardized versions of scales. These new variables will have the same name as scales but with a `"_z"` suffix.

See Also

Other tidying functions: [ipsatize](#), [score](#)

Examples

```
data("jz2017")
instrument("iipsc")
standardize(jz2017, PA:NO, octants(), instrument = iipsc, sample = 1)
```

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