

Package ‘IPV’

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Title Item Pool Visualization

Type Package

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Description Generate plots based on the Item Pool Visualization concept for latent constructs. Item Pool Visualizations are used to display the conceptual structure of a set of items (self-report or psychometric). Dantlgraber, Stieger, & Reips (2019) <doi:10.1177/2059799119884283>.

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coord_facets	<i>Coord Facets</i>
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Description

Generates the coordinates for a facet chart.

Usage

```
coord_facets(
  data,
  subradius = 0,
  tick = 0,
  rotate_radians = 0,
  rotate_degrees = 0,
  dist_test_label = 2/3,
  rotate_test_label_radians = 0,
  rotate_test_label_degrees = 0
)
```

Arguments

data	SEM estimates in the appropriate format, given by the input functions.
subradius	integer; same unit as center distances; radius of the facet circles; defaults to 0, in which case an appropriate value is estimated.
tick	numeric; axis tick position; defaults to 0, in which case an appropriate value is estimated.
rotate_radians	integer; radian angle to rotate the chart counter-clockwise by; use fractions of pi (e.g. $\pi/2 = 90$ degrees).
rotate_degrees	integer; angle in degrees to rotate the chart counter-clockwise by.
dist_test_label	integer; position of the test label relative to the surrounding circle; defaults to 2/3, in which case the test label is displayed 2/3 of the way from the center to the surrounding circle.
rotate_test_label_radians	integer; radian angle to rotate the test label counter-clockwise by; use fractions of pi (e.g. $\pi/2 = 90$ degrees).
rotate_test_label_degrees	integer; angle in degrees to rotate the global label counter-clockwise by.

Details

Use [facet_chart](#) to create facet charts.

Value

List containing coordinates of chart objects.

See Also

[plot_facets](#) [facet_chart](#)

 coord_items

Coord Items

Description

Generates the coordinates for an item chart.

Usage

```
coord_items(
  data,
  rotate_radians = 0,
  rotate_degrees = 0,
  dist_test_label = 0.5,
```

```

    rotate_test_label_radians = 0,
    rotate_test_label_degrees = 0,
    width_items = 1,
    length_items = 1,
    length_ratio_items = 1.5,
    dodge = 1
)

```

Arguments

data SEM estimates in the appropriate format, given by the input functions.

rotate_radians integer; radian angle to rotate the chart counter-clockwise by; use fractions of pi (e.g. $\pi/2 = 90$ degrees).

rotate_degrees integer; angle in degrees to rotate the chart counter-clockwise by.

dist_test_label integer; position of the test label relative to the surrounding circle; defaults to .5, in which case the test label is displayed halfway from the center to the surrounding circle.

rotate_test_label_radians integer; radian angle to rotate the test label counter-clockwise by; use fractions of pi (e.g. $\pi/2 = 90$ degrees).

rotate_test_label_degrees integer; angle in degrees to rotate the test label counter-clockwise by.

width_items integer; item bar width relative to default.

length_items integer; item bar length relative to default.

length_ratio_items integer; relative item bar length; defaults to 1.5.

dodge integer; horizontal outward dodge of facet labels relative to default.

Details

Use [item_chart](#) to create item charts.

Value

List containing coordinates of chart objects.

See Also

[plot_items](#) [coord_nested](#) [item_chart](#)

coord_nested	<i>Coord Nested</i>
--------------	---------------------

Description

Generates the coordinates for a nested chart and all other charts.

Usage

```
coord_nested(
  data,
  subradius = 0,
  tick = 0,
  rotate_radians = 0,
  rotate_degrees = 0,
  subrotate_radians = 0,
  subrotate_degrees = 0,
  dist_construct_label = 10,
  rotate_construct_label_radians = 0,
  rotate_construct_label_degrees = 0,
  dist_test_labels = 2/3,
  rotate_test_labels_radians = 0,
  rotate_test_labels_degrees = 0,
  prepare_item_charts = FALSE,
  correlations = TRUE,
  cor_spacing = 0,
  relative_scaling = 0,
  xarrows = NULL
)
```

Arguments

data	SEM estimates in the appropriate format, given by the input functions.
subradius	integer; same unit as center distances; radius of the facet circles; defaults to 0, in which case an appropriate value is estimated.
tick	numeric; axis tick position; defaults to 0, in which case an appropriate value is estimated.
rotate_radians	integer; radian angle to rotate the chart counter-clockwise by; use fractions of pi (e.g. $\pi/2 = 90$ degrees).
rotate_degrees	integer; angle in degrees to rotate the chart counter-clockwise by.
subrotate_radians	integer; radian angle or vector of radian angles to rotate the nested facet charts counter-clockwise by; use fractions of pi (e.g. $\pi/2 = 90$ degrees).
subrotate_degrees	integer; angle in degrees or vector of angles in degrees to rotate the nested facet charts counter-clockwise by.

dist_construct_label	integer; position of the construct label relative to the surrounding circle; defaults to 10, in which case an appropriate value is estimated; a value of .5 would position the label halfway between the center and the surrounding circle.
rotate_construct_label_radians	integer; radian angle to rotate the construct label counter-clockwise by; use fractions of pi (e.g. $\pi/2 = 90$ degrees).
rotate_construct_label_degrees	integer; angle in degrees to rotate the construct label counter-clockwise by.
dist_test_labels	integer; position of the test labels relative to the surrounding circle; defaults to 2/3, in which case the test labels are displayed 2/3 of the way from the centers to the surrounding circles.
rotate_test_labels_radians	integer; radian angle or vector of radian angles to rotate the test labels counter-clockwise by; use fractions of pi (e.g. $\pi/2 = 90$ degrees).
rotate_test_labels_degrees	integer; angle or vector of angle in degrees to rotate the test labels counter-clockwise by.
prepare_item_charts	logical; if TRUE, generates the item chart coordinates for all factors by calling coord_items .
correlations	logical; if TRUE, generates the coordinates for the latent correlations between tests. Sets up a ring to draw them in. If FALSE, the ring and the correlations are omitted, simplifying the chart significantly.
cor_spacing	integer; if correlations = TRUE: width of the ring, the latent correlations between tests are drawn in; defaults to 0, in which case an appropriate value is estimated.
relative_scaling	integer; relative size of the global chart scale compared to the nested facet chart scales; defaults to 0, in which case an appropriate value is estimated.
xarrows	data frame containing information about additional correlation arrows between facets of different tests; see examples.

Details

Use [nested_chart](#) to create nested charts.

Value

List containing coordinates of chart objects.

See Also

[plot_nested_nested_chart](#)

Description

A set of center distances and latent correlations for items and facets of the DSSEI, completed by 2272 german speaking participants using the german version of the questionnaire. SEM estimation performed on the DSSEI data alone (differing from the estimation in "self_confidence").

Usage

DSSEI

Format

An object of class `list` of length 2.

Items

__ Social Competence (So) __

1. I usually feel as if I have handled myself well at social gatherings.
5. I feel secure in social situations.
9. I feel confident of my social behaviour.
13. I am often troubled with shyness. (R)
17. At social gatherings I am often withdrawn, not at all outgoing. (R)

__ Task-Related Abilities (Ab) __

2. I feel as if I lack the necessary skills to really succeed at the work I do. (R)
6. I am able to do things as well as most other people.
10. I usually expect to succeed at the things I do.
14. I almost always accomplish the goals I set for myself.
18. In general, I feel confident about my abilities.

__ Physical Appeal (Ph) __

3. I feel that others would consider me to be attractive.
7. I'm not as nice looking as most people. (R)
11. I feel confident that my physical appearance is appealing to others.
15. I am satisfied with the way I look.
19. I feel unattractive compared to most people my age. (R)

__ Public Presentation (Pb) __

4. When I speak in a large group discussion, I usually feel sure of myself.
8. I enjoy being in front of large audiences.

12. I feel quite confident when speaking before a group of my peers.
16. I find it very hard to talk in front of a group. (R)
20. When I talk in front of a group of people my own age, I am usually somewhat worried or afraid. (R)

(Hoyle, R. H. (1991). Evaluating measurement models in clinical research: Covariance structure analysis of latent variable models of self-conception. *Journal of Consulting and Clinical Psychology*, 59(1), 67.)

Source

Dantlgraber, M., Stieger, S., & Reips, U. D. (2019). Introducing Item Pool Visualization: A method for investigation of concepts in self-reports and psychometric tests. *Methodological Innovations*, 12(3), 2059799119884283.

facet_chart

Facet Chart

Description

Creates a facet chart, showing the facets of a test.

Usage

```
facet_chart(
  data,
  subradius = 0,
  file_name = "none",
  size = 1,
  font = "sans",
  rotate_radians = 0,
  rotate_degrees = 0,
  file_width = 10,
  file_height = 10,
  dpi = 500,
  color = "black",
  fade = 85,
  tick = 0,
  cor_labels = TRUE,
  dist_test_label = 2/3,
  rotate_test_label_radians = 0,
  rotate_test_label_degrees = 0,
  size_cor_labels = 1,
  size_test_label = 1,
  size_facet_labels = 1,
  width_axes = 1,
  width_circles = 1,
```



```

    width_tick = 1,
    size_tick_label = 1
)

```

Arguments

data	SEM estimates in the appropriate format, given by the input functions.
subradius	integer; same unit as center distances; radius of the facet circles; defaults to 0, in which case an appropriate value is estimated.
file_name	character; name of the file to save. Supported formats are: "pdf" (highest quality and smallest file size), "png", "jpeg"; defaults to "none".
size	integer; changes the size of most chart objects simultaneously.
font	character; text font, use extrafonts to access additional fonts; defaults to "sans", which is "Helvetica".
rotate_radians	integer; radian angle to rotate the chart counter-clockwise by; use fractions of pi (e.g. $\pi/2 = 90$ degrees).
rotate_degrees	integer; angle in degrees to rotate the chart counter-clockwise by.
file_width	integer; file width in inches; defaults to 10.
file_height	integer; file height in inches; defaults to 10.
dpi	integer; resolution in dots per inch for "png" and "jpeg" files; defaults to 500.
color	accent color; defaults to "black".
fade	integer; brightness of the gray tones between 0 = "black" and 100 = "white" in steps of 1; defaults to 85.
tick	numeric; axis tick position; defaults to 0, in which case an appropriate value is estimated.
cor_labels	logical; if TRUE, shows latent correlations between facets; defaults to TRUE.
dist_test_label	integer; position of the test label relative to the surrounding circle; defaults to 2/3, in which case the test label is displayed 2/3 of the way from the center to the surrounding circle.
rotate_test_label_radians	integer; radian angle to rotate the test label counter-clockwise by; use fractions of pi (e.g. $\pi/2 = 90$ degrees).
rotate_test_label_degrees	integer; angle in degrees to rotate the global label counter-clockwise by.
size_cor_labels	integer; correlation font size relative to default.
size_test_label	integer; test font size relative to default.
size_facet_labels	integer; facet font size relative to default.
width_axes	integer; radial axis width relative to default.
width_circles	integer; facet circle outline width relative to default.
width_tick	integer; axis tick line width relative to default.
size_tick_label	integer; axis tick font size relative to default.

Details

Pdf files will be vector based and can be scaled arbitrarily. For other formats use `file_width`, `file_height`, and `dpi` to avoid later rescaling and loss of quality.

Value

Object of the class "ggplot".

See Also

[item_chart](#) [nested_chart](#)

Examples

```
# as simple as that:
facet_chart(SMTQ)
```

input_excel

Input Excel

Description

Reads excel files containing factor loadings and latent correlations for IPV charts.

Usage

```
input_excel(global = NULL, tests)
```

Arguments

<code>global</code>	character; name of the excel file containing factor loadings from the global level and the test level, and latent correlations from the test level.
<code>tests</code>	character; name(s) of the excel file(s) containing factor loadings from the test level and the facet level, and latent correlations from the facet level.

Details

Note that the excel files need a very specific structure. Use the example files as templates.

The `global` argument defaults to `NULL`. This allows to only use the `tests` argument, resulting in a simple model with one test and its facets.

If you specify an element in `tests` as `NA`, this test will be treated as having no facets.

Value

List containing formatted data including center distances for [item_chart](#), [facet_chart](#), and [nested_chart](#).

Examples

```
# read data for a simple model by ignoring the "global" parameter of input_excel
single_file <- system.file("extdata", "DSSEI.xlsx", package = "IPV", mustWork = TRUE)
x <- input_excel(tests = single_file)

# read data for a nested model
# note that the data needs to be split into several excel files as in the example
global <- system.file("extdata", "IPV_global.xlsx", package = "IPV", mustWork = TRUE)
tests <- c(system.file("extdata", "IPV_DSSEI.xlsx", package = "IPV", mustWork = TRUE),
           system.file("extdata", "IPV_SMTQ.xlsx", package = "IPV", mustWork = TRUE),
           system.file("extdata", "IPV_RSES.xlsx", package = "IPV", mustWork = TRUE))
x <- input_excel(global = global, tests = tests)
```

input_excel_factor	<i>Input Excel Factor</i>
--------------------	---------------------------

Description

Reads factor loadings and latent correlations from an excel file.

Usage

```
input_excel_factor(file)
```

Arguments

file	character; filename of the excel file
------	---------------------------------------

Details

Helper function of [input_excel](#).

Value

list containing formatted data including center distances for [item_chart](#), [facet_chart](#)

See Also

[input_excel](#)

input_manual_nested *Input Manual Nested*

Description

Generates manual data input for a nested model with several tests.

Usage

```
input_manual_nested(
  construct_name,
  test_names,
  items_per_test,
  item_names,
  construct_loadings,
  test_loadings,
  correlation_matrix
)
```

Arguments

`construct_name` character; the name of the overall construct.

`test_names` character; the names of the tests in correct order.

`items_per_test` integer; number of items per test in correct order (determined by `test_names`), if all tests have the same number of items a single number can be used, e.g. 10 instead of `c(10, 10, 10)`.

`item_names` character or integer; the names of the items in correct order (determined by `test_names`).

`construct_loadings` integer; vector of the factor loadings from the single factor model of the construct in correct order (determined by `item_names`).

`test_loadings` integer; vector of the factor loadings on the test factors from the group factor model in correct order (determined by `item_names`).

`correlation_matrix` matrix containing the latent correlations between tests, pay attention to the order of rows and columns, which is determined by `test_names`.

Details

Pay attention to the order of tests and items, it has to be coherent throughout the whole data. `test_names` and `items_per_test` determine which test is listed first and how many items are listed for that test. `item_names`, `construct_loadings` and `test_loadings` have to match that order. The correlation matrix uses the order in `test_names` for rows and columns.

This function only lists the name of the tests in `output$tests`. For each of those tests, the data on the facets needs to be added using [input_manual_simple](#). Every test for which you do not provide this data will be treated as having no facets.

Visually inspect the returned object before continuing with [input_manual_process!](#)

Value

list containing "raw" data. The data on the facets of the tests needs to be added using [input_manual_simple](#). Afterwards, the whole data needs to be pre-processed using [input_manual_process](#).

See Also

[input_manual_simple](#) [input_manual_process](#)

Examples

```
# these data can also be seen in self_confidence, the example data of
# this package
mydata <- input_manual_nested(
  construct_name = "Self-Confidence",
  test_names = c("DSSEI", "SMTQ", "RSES"),
  items_per_test = c(20, 14, 10),
  item_names = c(
    1, 5, 9, 13, 17, # DSSEI
    3, 7, 11, 15, 19, # DSSEI
    16, 4, 12, 8, 20, # DSSEI
    2, 6, 10, 14, 18, # DSSEI
    11, 13, 14, 1, 5, 6, # SMTQ
    3, 10, 12, 8, # SMTQ
    7, 2, 4, 9, # SMTQ
    1, 3, 4, 7, 10, # RSES
    2, 5, 6, 8, 9), # RSES
  construct_loadings = c(
    .5189, .6055, .618, .4074, .4442,
    .5203, .2479, .529, .554, .5144,
    .3958, .5671, .5559, .4591, .4927,
    .3713, .5941, .4903, .5998, .6616,
    .4182, .2504, .4094, .3977, .5177, .4603,
    .3271, .261, .3614, .4226,
    .2076, .3375, .5509, .3495,
    .5482, .4627, .4185, .4185, .5319,
    .4548, .4773, .4604, .4657, .4986),
  test_loadings = c(
    .5694, .6794, .6615, .4142, .4584, # DSSEI
    .5554, .2165, .5675, .5649, .4752, # DSSEI
    .443, .6517, .6421, .545, .5266, # DSSEI
    .302, .6067, .5178, .5878, .6572, # DSSEI
    .4486, .3282, .4738, .4567, .5986, .5416, # SMTQ
    .3602, .2955, .3648, .4814, # SMTQ
    .2593, .4053, .61, .4121, # SMTQ
    .6005, .4932, .4476, .5033, .6431, # RSES
    .5806, .5907, .6179, .5899, .6559), # RSES
  correlation_matrix = matrix(data = c( 1, .73, .62,
                                       .73, 1, .75,
                                       .62, .75, 1),
                              nrow = 3,
                              ncol = 3))
mydata
```

input_manual_process *Input Manual Process*

Description

Pre-processes the SEM estimates listed using [input_manual_simple](#) or [input_manual_nested](#) for the use of chart functions.

Usage

```
input_manual_process(data)
```

Arguments

`data` list generated by [input_manual_simple](#) or [input_manual_nested](#) with complete data.

Value

List containing formatted data including center distances for [item_chart](#), [facet_chart](#), and [nested_chart](#).

See Also

[input_manual_simple](#) [input_manual_nested](#)

Examples

```
# these RSES data can also be seen in self_confidence, the example data of
# this package
mydata <- input_manual_simple(
  test_name = "RSES",
  facet_names = c("Ns", "Ps"),
  items_per_facet = 5,
  item_names = c(2, 5, 6, 8, 9,
                 1, 3, 4, 7, 10),
  test_loadings = c(.5806, .5907, .6179, .5899, .6559,
                   .6005, .4932, .4476, .5033, .6431),
  facet_loadings = c(.6484, .6011, .6988, .6426, .6914,
                    .6422, .5835, .536, .5836, .6791),
  correlation_matrix = matrix(data = c(1, .69,
                                       .69, 1),
                              nrow = 2,
                              ncol = 2))

mydata
input_manual_process(mydata)
```

input_manual_process_factor
Input Manual Process Factor

Description

Helper function of [input_manual_process](#).

Usage

```
input_manual_process_factor(data)
```

Arguments

data list generated by [input_manual_simple](#) with complete data.

Value

List containing formatted data including center distances for a single factor.

input_manual_simple *Input Manual Simple*

Description

Generates manual data input for a simple model with one test.

Usage

```
input_manual_simple(  
  test_name,  
  facet_names,  
  items_per_facet,  
  item_names,  
  test_loadings,  
  facet_loadings,  
  correlation_matrix  
)
```

Arguments

test_name	character; the name of the test.
facet_names	character; the names of the facets in correct order.
items_per_facet	integer; number of items per facet in correct order (determined by facet_names), if all facets have the same number of items a single number can be used, e.g. 5 instead of c(5, 5, 5, 5).
item_names	character or integer; the names of the items in correct order (determined by facet_names).
test_loadings	integer; vector of the factor loadings from the single factor model of the test or a group factor model of multiple tests in correct order (determined by item_names).
facet_loadings	integer; vector of the factor loadings on the facet factors from the group factor model in correct order (determined by item_names).
correlation_matrix	matrix containing the latent correlations between facets, pay attention to the order of rows and columns, which is determined by facet_names.

Details

Pay attention to the order of facets and items, it has to be coherent throughout the whole data. facet_names and items_per_facet determine which facet is listed first and how many items there are listed for that facet. item_names, test_loadings and facet_loadings have to match that order. The correlation matrix uses the order in facet_names for rows and columns.

Visually inspect the returned object before continuing with [input_manual_process!](#)

Value

list containing "raw" data, that needs to be pre-processed using [input_manual_process](#).

See Also

[input_manual_nested](#) [input_manual_process](#)

Examples

```
# these RSES data can also be seen in self_confidence, the example data of
# this package
mydata <- input_manual_simple(
  test_name = "RSES",
  facet_names = c("Ns", "Ps"),
  items_per_facet = 5,
  item_names = c(2, 5, 6, 8, 9,
                 1, 3, 4, 7, 10),
  test_loadings = c(.5806, .5907, .6179, .5899, .6559,
                   .6005, .4932, .4476, .5033, .6431),
  facet_loadings = c(.6484, .6011, .6988, .6426, .6914,
                    .6422, .5835, .536, .5836, .6791),
  correlation_matrix = matrix(data = c(1, .69,
```



```
                                .69, 1),  
                                nrow = 2,  
                                ncol = 2))  
mydata  
input_manual_process(mydata)
```

Description

The IPV package provides two sets of functions: input functions, and chart functions.

Input Functions

The input functions prepare your data for the chart functions. Input data manually using loose input within R [input_manual_simple](#) (and possibly [input_manual_nested](#)) combined with [input_manual_process](#). Or input data via MS Excel files and [input_excel](#) as demonstrated in the examples.

Chart Functions

Chart functions create a ggplot2 object (the chart). There are three types of charts. All functions have several parameters for customization. Yet, there are sensible default values for everything but the data. [item_chart](#) [facet_chart](#) [nested_chart](#)

Workflow

Prepare your data using the input functions. Choose the chart type. Use the chart function with your data, a filename and defaults. Then

1. change the parameter values of the chart function
2. check the chart appearance by opening the created file (do not rely on the display of plots in R, results may differ)
3. repeat until you are satisfied with the result

`item_chart`*Item Chart*

Description

Creates an item chart, showing the items of a test arranged by facets.

Usage

```
item_chart(  
  data,  
  file_name = "none",  
  size = 1,  
  font = "sans",  
  rotate_radians = 0,  
  rotate_degrees = 0,  
  file_width = 12,  
  file_height = 10,  
  dpi = 500,  
  color = "black",  
  color2 = "black",  
  fade_axes = 50,  
  fade_grid_major = 15,  
  fade_grid_minor = 65,  
  dodge = 1,  
  dist_test_label = 0.5,  
  rotate_test_label_radians = 0,  
  rotate_test_label_degrees = 0,  
  width_items = 1,  
  length_items = 1,  
  length_ratio_items = 1.5,  
  size_tick_label = 1,  
  size_test_label = 1,  
  size_facet_labels = 1,  
  width_axes = 1,  
  size_arrow_heads = 1,  
  width_grid = 1  
)
```

Arguments

<code>data</code>	SEM estimates in the appropriate format, given by the input functions.
<code>file_name</code>	character; name of the file to save. Supported formats are: "pdf" (highest quality and smallest file size), "png", "jpeg"; defaults to "none".
<code>size</code>	integer; changes the size of most chart objects simultaneously.
<code>font</code>	character; text font, use <code>extrafonts</code> to access additional fonts; defaults to "sans", which is "Helvetica".

rotate_radians	integer; radian angle to rotate the chart counter-clockwise by; use fractions of pi (e.g. $\pi/2 = 90$ degrees).
rotate_degrees	integer; angle in degrees to rotate the chart counter-clockwise by.
file_width	integer; file width in inches; defaults to 12.
file_height	integer; file height in inches; defaults to 10.
dpi	integer; resolution in dots per inch for "png" and "jpeg" files; defaults to 500.
color	first accent color; defaults to "black".
color2	second accent color; defaults to "black".
fade_axes	integer; brightness of the gray tone of the axes between 0 = "black" and 100 = "white" in steps of 1; defaults to 50.
fade_grid_major	integer; brightness of the gray tone of the major grid lines between 0 = "black" and 100 = "white" in steps of 1; defaults to 15.
fade_grid_minor	integer; brightness of the gray tone of the minor grid lines between 0 = "black" and 100 = "white" in steps of 1; defaults to 65.
dodge	integer; horizontal outward dodge of facet labels relative to default.
dist_test_label	integer; position of the test label relative to the surrounding circle; defaults to .5, in which case the test label is displayed halfway from the center to the surrounding circle.
rotate_test_label_radians	integer; radian angle to rotate the test label counter-clockwise by; use fractions of pi (e.g. $\pi/2 = 90$ degrees).
rotate_test_label_degrees	integer; angle in degrees to rotate the test label counter-clockwise by.
width_items	integer; item bar width relative to default.
length_items	integer; item bar length relative to default.
length_ratio_items	integer; relative item bar length; defaults to 1.5.
size_tick_label	integer; axis tick label font size relative to default.
size_test_label	integer; test label font size relative to default.
size_facet_labels	integer; facet label font size relative to default.
width_axes	integer; radial axis width relative to default.
size_arrow_heads	integer; arrow head size relative to default.
width_grid	integer; grid line width relative to default.

Details

When changing the size of objects, consider the size parameter first and make specific adjustments with the other size_ and width_ parameters after.

To better display overlapping item values, change the width of the item bars, or set the accent colors to different values, or change the ratio of item lengths.

Pdf files will be vector based and can be scaled arbitrarily. For other formats use file_width, file_height, and dpi to avoid later rescaling and loss of quality.

Value

Object of the class "ggplot" and, by default, the same object saved as a file.

See Also

[facet_chart](#) [nested_chart](#)

Examples

```
# as simple as that
item_chart(SMTQ)
```

nested_chart

Nested Chart

Description

Creates a nested chart, showing several tests and their facets.

Usage

```
nested_chart(  
  data,  
  xarrows = NULL,  
  subradius = 0,  
  file_name = "none",  
  size = 1,  
  relative_scaling = 0,  
  show_xarrows = FALSE,  
  font = "sans",  
  rotate_radians = 0,  
  rotate_degrees = 0,  
  subrotate_radians = 0,  
  subrotate_degrees = 0,  
  file_width = 10,  
  file_height = 10,  
  dpi = 500,
```

```

color_global = "black",
color_nested = "black",
fade = 85,
cor_spacing = 0,
tick = 0,
dist_construct_label = 10,
rotate_construct_label_radians = 0,
rotate_construct_label_degrees = 0,
dist_test_labels = 2/3,
rotate_test_labels_radians = 0,
rotate_test_labels_degrees = 0,
cor_labels_tests = TRUE,
cor_labels_facets = TRUE,
size_construct_label = 1,
size_test_labels = 1,
size_facet_labels = 1,
width_axes = 1,
width_axes_inner = 1,
width_circles = 1,
width_circles_inner = 1,
width_tick = 1,
width_tick_inner = 1,
size_tick_label = 1,
size_cor_labels = 1,
size_cor_labels_inner = 1,
width_xarrows = 1,
size_xarrow_heads = 1,
size_xarrow_labels = 1
)

```

Arguments

data	SEM estimates in the appropriate format, given by the input functions.
xarrows	data frame containing information about additional correlation arrows between facets of different tests; see examples.
subradius	integer; same unit as center distances; radius of the facet circles; defaults to 0, in which case an appropriate value is estimated.
file_name	character; name of the file to save. Supported formats are: "pdf" (highest quality and smallest file size), "png", "jpeg"; defaults to "none".
size	integer; changes the size of most chart objects simultaneously.
relative_scaling	integer; relative size of the global chart scale compared to the nested facet chart scales; defaults to 0, in which case an appropriate value is estimated.
show_xarrows	logical; if TRUE, shows correlation arrows between facets of different tests, according to xarrows.
font	character; text font, use extrafonts to access additional fonts; defaults to "sans", which is "Helvetica".

rotate_radians	integer; radian angle to rotate the chart counter-clockwise by; use fractions of pi (e.g. $\pi/2 = 90$ degrees).
rotate_degrees	integer; angle in degrees to rotate the chart counter-clockwise by.
subrotate_radians	integer; radian angle or vector of radian angles to rotate the nested facet charts counter-clockwise by; use fractions of pi (e.g. $\pi/2 = 90$ degrees).
subrotate_degrees	integer; angle or vector of angles in degrees to rotate the nested facet charts counter-clockwise by.
file_width	integer; file width in inches; defaults to 10.
file_height	integer; file height in inches; defaults to 10.
dpi	integer; resolution in dots per inch for "png" and "jpeg" files; defaults to 500.
color_global	global accent color; defaults to "black".
color_nested	nested accent color; defaults to "black".
fade	integer; brightness of the gray tones between 0 (black) and 100 (white) in steps of 1; defaults to 85.
cor_spacing	integer; if correlations = TRUE: width of the ring, the correlations between tests are drawn in; defaults to 0, in which case an appropriate value is estimated.
tick	numeric; axis tick position; defaults to 0, in which case an appropriate value is estimated.
dist_construct_label	integer; position of the construct label relative to the surrounding circle; defaults to 10, in which case an appropriate value is estimated; a value of .5 would position the label halfway between the center and the surrounding circle.
rotate_construct_label_radians	integer; radian angle to rotate the construct label counter-clockwise by; use fractions of pi (e.g. $\pi/2 = 90$ degrees).
rotate_construct_label_degrees	integer; angle in degrees to rotate the construct label counter-clockwise by.
dist_test_labels	integer; position of the test labels relative to the surrounding circle; defaults to 2/3, in which case the test labels are displayed 2/3 of the way from the centers to the surrounding circles.
rotate_test_labels_radians	integer; radian angle or vector of radian angles to rotate the test labels counter-clockwise by; use fractions of pi (e.g. $\pi/2 = 90$ degrees).
rotate_test_labels_degrees	integer; angle or vector of angle in degrees to rotate the test labels counter-clockwise by.
cor_labels_tests	logical; if TRUE, shows the correlations between tests as text.
cor_labels_facets	logical; if TRUE, shows the correlations between facets as text.

size_construct_label	integer; construct label font size relative to default.
size_test_labels	integer; test label font size relative to default.
size_facet_labels	integer; facet label font size relative to default.
width_axes	integer; global radial axis width relative to default.
width_axes_inner	integer; nested radial axis width relative to default.
width_circles	integer; global circle outline width relative to default.
width_circles_inner	integer; nested circle outline width relative to default.
width_tick	integer; global axis tick line width relative to default.
width_tick_inner	integer; nested axis tick line width relative to default.
size_tick_label	integer; axis tick label font size relative to default.
size_cor_labels	integer; font size of the correlations between tests relative to default.
size_cor_labels_inner	integer; font size of the correlations between facets relative to default.
width_xarrows	integer; extra arrow line width relative to default.
size_xarrow_heads	integer; extra arrow head length relative to default.
size_xarrow_labels	integer; font size of the correlations indicated by extra arrows relative to default.

Details

To get tidy results, it is often required to use `rotate_` and `subrotate_` for better alignment.

If you set `subrotate_` to a single value, all nested facet charts will be rotated by the same amount. If you use a vector of values, the nested facet charts will be rotated one by one by the values from that vector.

Increase `relative_scaling` to avoid circle overlap. Decrease it to make small chart objects more visible.

`correlations` and `cor_spacing` add larger circles around the nested facet charts, but do not change these facet charts.

When changing the size of objects, consider the `size` parameter first and make specific adjustments with the other `size_` and `width_` parameters after.

Pdf files will be vector based and can be scaled arbitrarily. For other formats use `file_width`, `file_height`, and `dpi` to avoid later rescaling and loss of quality.

Value

Object of the class "ggplot".

See Also

[item_chart](#) [facet_chart](#)

Examples

```
# as simple as that
nested_chart(self_confidence, subradius = .6)

# adding xarrows, in this example for all cases where the correlation between
# facets exceeds the correlation between their respective tests.
sc_arrows <- data.frame(test1 = rep(NA, 3),
                        facet1 = NA,
                        test2 = NA,
                        facet2 = NA,
                        value = NA)
sc_arrows[1, ] <- c("DSSEI", "Ab", "RSES", "Ps", ".67")
sc_arrows[2, ] <- c("DSSEI", "Ab", "SMTQ", "Cs", ".81")
sc_arrows[3, ] <- c("SMTQ", "Ct", "RSES", "Ns", ".76")
nested_chart(self_confidence,
             subradius = .6,
             xarrows = sc_arrows,
             show_xarrows = TRUE)

# rotating the nested facet charts one by one
nested_chart(self_confidence,
             subradius = .6,
             subrotate_radians = c(0, pi / 2, 0))

# test without facets

global <- system.file("extdata", "IPV_global.xlsx", package = "IPV", mustWork = TRUE)
tests <- c(system.file("extdata", "IPV_DSSEI.xlsx", package = "IPV", mustWork = TRUE),
          system.file("extdata", "IPV_SMTQ.xlsx", package = "IPV", mustWork = TRUE),
          NA)
x <- input_excel(global = global, tests = tests)
nested_chart(x)
```

plot_facets

Plot Facets

Description

Generates a facet chart from coordinates.

Usage

```
plot_facets(
  coord,
```



```

    size = 1,
    file_name = "none",
    file_width = 10,
    file_height = 10,
    dpi = 500,
    color = "black",
    fade = 85,
    font = "sans",
    cor_labels = TRUE,
    size_cor_labels = 1,
    size_test_label = 1,
    size_facet_labels = 1,
    width_axes = 1,
    width_circles = 1,
    width_tick = 1,
    size_tick_label = 1
)

```

Arguments

coord	list generated by coord_facets or coord_nested .
size	integer; changes the size of most chart objects simultaneously.
file_name	character; name of the file to save. Supported formats are: "pdf" (highest quality and smallest file size), "png", "jpeg"; defaults to "none".
file_width	integer; file width in inches; defaults to 10.
file_height	integer; file height in inches; defaults to 10.
dpi	integer; resolution in dots per inch for "png" and "jpeg" files; defaults to 500.
color	accent color; defaults to "black".
fade	integer; brightness of the gray tones between 0 = "black" and 100 = "white" in steps of 1; defaults to 85.
font	character; text font, use <code>extrafonts</code> to access additional fonts; defaults to "sans", which is "Helvetica".
cor_labels	logical; if TRUE, shows latent correlations between facets; defaults to TRUE.
size_cor_labels	integer; correlation font size relative to default.
size_test_label	integer; test font size relative to default.
size_facet_labels	integer; facet font size relative to default.
width_axes	integer; radial axis width relative to default.
width_circles	integer; facet circle outline width relative to default.
width_tick	integer; axis tick line width relative to default.
size_tick_label	integer; axis tick font size relative to default.

Details

Use [facet_chart](#) to create facet charts.

Value

Object of the class "ggplot".

See Also

[coord_facets](#) [facet_chart](#)

plot_items

Plot Items

Description

Generates an item chart from coordinates.

Usage

```
plot_items(  
  coord,  
  size = 1,  
  file_name = "none",  
  file_width = 12,  
  file_height = 10,  
  dpi = 500,  
  color = "black",  
  color2 = "black",  
  fade_axes = 50,  
  fade_grid_major = 15,  
  fade_grid_minor = 65,  
  font = "sans",  
  size_tick_label = 1,  
  size_test_label = 1,  
  size_facet_labels = 1,  
  width_axes = 1,  
  size_arrow_heads = 1,  
  width_items = 1,  
  width_grid = 1  
)
```

Arguments

`coord` list generated by [coord_items](#) or [coord_nested](#).
`size` integer; changes the size of most chart objects simultaneously.

file_name	character; name of the file to save. Supported formats are: "pdf" (highest quality and smallest file size), "png", "jpeg"; defaults to "none".
file_width	integer; file width in inches; defaults to 12.
file_height	integer; file height in inches; defaults to 10.
dpi	integer; resolution in dots per inch for "png" and "jpeg" files; defaults to 500.
color	first accent color; defaults to "black".
color2	second accent color; defaults to "black".
fade_axes	integer; brightness of the gray tone of the axes between 0 = "black" and 100 = "white" in steps of 1; defaults to 50.
fade_grid_major	integer; brightness of the gray tone of the major grid lines between 0 = "black" and 100 = "white" in steps of 1; defaults to 15.
fade_grid_minor	integer; brightness of the gray tone of the minor grid lines between 0 = "black" and 100 = "white" in steps of 1; defaults to 65.
font	character; text font, use <code>extrafonts</code> to access additional fonts; defaults to "sans", which is "Helvetica".
size_tick_label	integer; axis tick label font size relative to default.
size_test_label	integer; test font size relative to default.
size_facet_labels	integer; facet font size relative to default.
width_axes	integer; radial axis width relative to default.
size_arrow_heads	integer; arrow head size relative to default.
width_items	integer; item bar width relative to default.
width_grid	integer; grid line width relative to default.

Details

Use [item_chart](#) to create item charts.

Value

Object of the class "ggplot".

See Also

[coord_items](#) [item_chart](#)

`plot_nested`*Plot Nested*

Description

Generates a nested chart from coordinates.

Usage

```
plot_nested(  
  coord,  
  size = 1,  
  file_name = "none",  
  file_width = 10,  
  file_height = 10,  
  dpi = 500,  
  cor_labels_tests = TRUE,  
  cor_labels_facets = TRUE,  
  color_global = "black",  
  color_nested = "black",  
  fade = 85,  
  font = "sans",  
  show_xarrows = FALSE,  
  size_construct_label = 1,  
  size_test_labels = 1,  
  size_facet_labels = 1,  
  width_axes = 1,  
  width_axes_inner = 1,  
  width_circles = 1,  
  width_circles_inner = 1,  
  width_tick = 1,  
  width_tick_inner = 1,  
  size_tick_label = 1,  
  size_cor_labels = 1,  
  size_cor_labels_inner = 1,  
  width_xarrows = 1,  
  size_xarrow_heads = 1,  
  size_xarrow_labels = 1  
)
```

Arguments

<code>coord</code>	list generated by <code>coord_nested</code> .
<code>size</code>	integer; changes the size of most chart objects simultaneously.
<code>file_name</code>	character; name of the file to save. Supported formats are: "pdf" (highest quality and smallest file size), "png", "jpeg"; defaults to "none".

file_width	integer; file width in inches; defaults to 10.
file_height	integer; file height in inches; defaults to 10.
dpi	integer; resolution in dots per inch for "png" and "jpeg" files; defaults to 500.
cor_labels_tests	logical; if TRUE, shows the correlations between tests as text.
cor_labels_facets	logical; if TRUE, shows the correlations between facets as text.
color_global	global accent color; defaults to "black".
color_nested	nested accent color; defaults to "black".
fade	integer; brightness of the gray tones between 0 (black) and 100 (white) in steps of 1; defaults to 85.
font	character; text font, use extrafonts to access additional fonts; defaults to "sans", which is "Helvetica".
show_xarrows	logical; if TRUE, shows correlation arrows between facets of different tests, according to xarrows.
size_construct_label	integer; construct label font size relative to default.
size_test_labels	integer; test label font size relative to default.
size_facet_labels	integer; facet label font size relative to default.
width_axes	integer; global radial axis width relative to default.
width_axes_inner	integer; nested radial axis width relative to default.
width_circles	integer; global circle outline width relative to default.
width_circles_inner	integer; nested circle outline width relative to default.
width_tick	integer; global axis tick line width relative to default.
width_tick_inner	integer; nested axis tick line width relative to default.
size_tick_label	integer; axis tick label font size relative to default.
size_cor_labels	integer; font size of the correlations between tests relative to default.
size_cor_labels_inner	integer; font size of the correlations between facets relative to default.
width_xarrows	integer; extra arrow line width relative to default.
size_xarrow_heads	integer; extra arrow head length relative to default.
size_xarrow_labels	integer; font size of the correlations indicated by extra arrows relative to default.

Details

Use [nested_chart](#) to create nested charts

Value

Object of the class "ggplot" and, by default, the same object saved as a file.

See Also

[coord_nested](#) [nested_chart](#)

self_confidence

Self-Confidence

Description

A set of center distances and latent correlations for items and facets of the Domain Specific Self-Esteem Inventory (DSSEI), Sports Mental Toughness Questionnaire (SMTQ), and Rosenberg Self-Esteem Scale (RSES) completed by 2272 german speaking participants using the german versions of the questionnaires. SEM estimation performed for all tests as one item pool.

Usage

self_confidence

Format

An object of class list of length 2.

Items

_____ RSES _____

__ Positive Self-Esteem (Ps) __

1. On the whole, I am satisfied with myself.
3. I feel that I have a number of good qualities.
4. I am able to do things as well as most other people.
7. I feel that I'm a person of worth.
10. I take a positive attitude toward myself.

__ Lack of Negative Self-Esteem (Ns) __

2. At times I think I am no good at all.
5. I feel I do not have much to be proud of.
6. I certainly feel useless at times.
8. I wish I could have more respect for myself.

9. All in all, I am inclined to think that I am a failure.

(Rosenberg, M. (1965). Rosenberg self-esteem scale (RSE). Acceptance and commitment therapy. Measures package, 61, 52.)

_____ SMTQ _____

SMTQ

_____ DSSEI _____

DSSEI

Source

Dantlgraber, M., Stieger, S., & Reips, U. D. (2019). Introducing Item Pool Visualization: A method for investigation of concepts in self-reports and psychometric tests. *Methodological Innovations*, 12(3), 2059799119884283.

SMTQ

Sports Mental Toughness Questionnaire

Description

A set of center distances and latent correlations for items and facets of the SMTQ, completed by 2272 german speaking participants using the german version of the questionnaire. SEM estimation performed together with DSSEI and RSES (same as in "self_confidence").

Usage

SMTQ

Format

An object of class `list` of length 2.

Items

___ Confidence (Cf) ___

13. I interpret potential threats as positive opportunities

5. I have an unshakeable confidence in my ability

11. I have qualities that set me apart from other competitors

6. I have what it takes to perform well while under pressure

14. Under pressure, I am able to make decisions with confidence and commitment

1. I can regain my composure if I have momentarily lost it

___ Constancy (Cs) ___

3. I am committed to completing the tasks I have to do

12. I take responsibility for setting myself challenging targets

- 8. I give up in difficult situations
- 10. I get distracted easily and lose my concentration
- ___ Control (Ct) ___
- 2. I worry about performing poorly
- 4. I am overcome by self-doubt
- 9. I get anxious by events I did not expect or cannot control
- 7. I get angry and frustrated when things do not go my way

(Sheard, M., Golby, J., & Van Wersch, A. (2009). Progress toward construct validation of the Sports Mental Toughness Questionnaire (SMTQ). *European Journal of Psychological Assessment*, 25(3), 186-193.)

Source

Dantlgraber, M., Stieger, S., & Reips, U. D. (2019). Introducing Item Pool Visualization: A method for investigation of concepts in self-reports and psychometric tests. *Methodological Innovations*, 12(3), 2059799119884283.

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