Package 'IMak'

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Type Package

Title Item Maker

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Description This is an Automatic Item Generator for Psychological Assessment. Items created with the 'IMak' package should not be used in applied settings as part of the working protocol without ensuring first that the items meet the required psychometric quality standards (see Blum & Holling, 2018) <DOI:10.3389/fpsyg.2018.01286>.

Imports grDevices, graphics, utils, imager

License GPL-3

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R topics documented:

afs *Analogy from stimuli.*

Description

Creates an analogy item from pre-made stimuli, the latter being either figural or verbal. To create figural analogies from stimuli generated by IMak, the build_fa and plot_fa functions should be used.

Usage

```
afs(
  path,
  type = "F",
  sa,
  sb,
  sc,
  s1 = "No content",
  s2 = "No content",
  s3 = "No content",
  s4 = "No content",
  s5 = "No content",
  s6 = "No content",
  s7 = "No content",
  s8 = "No content",
  s9 = "No content",
  s10 = "No content",
  relations = "A",
  question = T,
  labels = "L",
  ai.idn = F,
  size.arrow = 34,
  size.arrowhead = 3,
  size.colon = 55,
  size.relword = 32,
  size.q = 85,
  size.word = 32,
  size.label = 25,
  language = "E",
  out = "item"
)
```

Arguments

path	Directory where files are saved and/or collected. For example: "C:/Desktop/Folder". For a figural item, figural stimuli should be placed inside the correspondent folder.

type	Should the afs function create a figural ("F") or a verbal ("V") item?
sa	String with stimulus name A of an A:B::C:D analogy, including point and PNG, JPEG or BMP extension when type = "F".
sb	String with stimulus name B of an A:B::C:D analogy, including point and PNG, JPEG or BMP extension when type = "F".
sc	String with stimulus name C of an A:B::C:D analogy, including point and PNG, JPEG or BMP extension when type = "F".
s1	String with response option name 1, including point and PNG, JPEG or BMP extension when type = "F".
s2	String with response option name 2, including point and PNG, JPEG or BMP extension when type = "F".
s3	String with response option name 3, including point and PNG, JPEG or BMP extension when type = "F".
s4	String with response option name 4, including point and PNG, JPEG or BMP extension when type = "F".
s5	String with response option name 5, including point and PNG, JPEG or BMP extension when type = "F".
s6	String with response option name 6, including point and PNG, JPEG or BMP extension when type = "F".
s7	String with response option name 7, including point and PNG, JPEG or BMP extension when type = "F".
s8	String with response option name 8, including point and PNG, JPEG or BMP extension when type = "F".
s9	String with response option name 9, including point and PNG, JPEG or BMP extension when type = "F".
s10	String with response option name 10, including point and PNG, JPEG or BMP extension when type = "F".
relations	Should analogical relations be indicated by arrows and a colon ("A"), just colons ("C") or words ("W")?
question	Should there be a question mark?
labels	Should options be labeled by letters ("L"), numbers ("N") or no labels (F)?
ai.idn	Should there be "All incorrect" and "I don't know" options?
size.arrow	Thickness of the arrow.
size.arrowhead	Size of the arrowhead.
size.colon	Size of the colon.
size.relword	Size of words that relate the stimuli of the A:B::C:D stem to each other.
size.q	Size of the question mark.
size.word	Size of verbal stimuli excluding labels and words of the stem (for these two, use size.label and size.relword respectively).
size.label	Size of labels.
language	Language of verbal stimuli including words of the stem.
out	Output file name.

Details

Create an analogy item by using pre-made stimuli. Such stimuli can be either figural or verbal, and it should be sufficient to complete the A, B and C terms of an A:B::C:D analogy stem plus at least two answer options. Use a source/target folder to save the item by providing an argument to `path`. For a figural item, save the pre-made figures inside that folder (the ideal would be to supply perfect-square high-resolution images). Give arguments to `sa`, `sb` and `sc`, thus indicating the names of stimuli A, B and C. Give arguments to `s1` and `s2` to indicate the names of two answer options. Provide further arguments to parameters `s3` to `s10` if you would like to add up to 10 options in total. All of these names are the image file names plus their extensions when you want to create a figural item. Include "All incorrect" and "I don't know" options by setting `ai.idn` to `TRUE`. Other variables that can be altered are: the way of indicating the A:B::C:D relations, the question mark, the option labels, the sizes and the language of verbal stimuli.

Value

A PNG file containing the item.

Author(s)

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`build_fa` *Build figural analogies.*

Description

`build_fa` generates the information of figural analogies that can be read by `plot_fa`.

Usage

```
build_fa(
  isomorphs = 1,
  main.rot = c(0, 0),
  mirror = 0,
  trap.rot = c(0, 0),
  subtract = c(0, 0),
  dot.mov = c(0, 0),
  a.main = "R",
  a.flip = "R",
  a.trap = "R",
  a.dot = "R",
  constrict = F,
  al.main.rot = 0,
  al.mirror = 0,
  al.trap.rot = 0,
  al.subtract = 0,
  al.dot.mov = 0,
```

```
  correct = 0,
  add.rule = 0,
  automatic = T
)
```

Arguments

isomorphs	A number of isomorphic items to be developed.
main.rot	A numeric vector with two main shape rotation values multiple of 45 and between -135 and 180. No rotation: 0.
mirror	A number designating the presence of shape reflection or no reflection (i.e., 1 or 0).
trap.rot	A numeric vector with two trapezium rotation values multiple of 45 and between -135 and 180. No rotation: 0.
subtract	A numeric vector with two line segments of the main shape to subtract from 1 to 5, or letter "R" for a random subtraction. No subtraction: 0.
dot.mov	A numeric vector with two dot edge movement amounts, with a maximum of 5 movements in total. No dot edge movement: 0.
a.main	A numeric vector with possible rotation states of the main shape of Figure A from 1 to 8. Random by default.
a.flip	A logical value designating whether Figure A is flipped with respect to its vertical axis or not (i.e., T or F). Random by default.
a.trap	A numeric vector with possible rotation states of the trapezium of Figure A from 1 to 8. Random by default.
a.dot	A numeric vector with possible dot positions in Figure A from 1 to 6. Random by default.
constrict	A character string designating a part of Figure A to display all possible positions every 'n' isomorphs.
al.main.rot	A numeric vector with alternative main shape rotation solutions. Random by default.
al.mirror	A numeric vector with alternative reflection solutions. Random by default.
al.trap.rot	A numeric vector with alternative trapezium rotation solutions. Random by default.
al.subtract	A numeric vector with alternative subtraction solutions. Random by default.
al.dot.mov	A numeric vector with alternative dot edge movement solutions. Random by default.
correct	A vector with numbers ranging from 1 to 9 for correct response placements. Random by default.
add.rule	A number specifying which rule from 1 to 5 adds itself to the options of one-rule-based items. Random by default.
automatic	Should options be generated by the program? True by default.

Details

Thorough information about the `build_fa` function can be found in the cited research paper of Blum and Holling (2018). Make sure to read the PDF version of it, since it is clearer. Additional information can also be found on icar-project.com.

Value

An object of class `'fa_items'`, basically a list including elements to be plotted with function `plot_fa`.

Author(s)

Diego Blum <<blumworx@gmail.com>>

References

Blum, D., & Holling, H. (2018). Automatic generation of figural analogies with the IMak package. *Frontiers in psychology, 9*(1286), 1-13. <DOI:10.3389/fpsyg.2018.01286>

See Also

`plot_fa`

Examples

```
## Create two isomorphs with one rule, and set the correct answer to 1:
one <- build_fa(isomorphs = 2, dot.mov = c(1, 2), correct = 1)
## For plotting options, see the plot_fa examples.

## Create four isomorphs with two rules:
two <- build_fa(isomorphs = 4, main.rot = c(180, 135), trap.rot = c(90, 45))
## For plotting options, see the plot_fa examples.

## Create 20 isomorphs with three rules. Set automatic = FALSE and affect the options:
three <- build_fa(isomorphs = 20, mirror = 1, trap.rot = c(90, 45), dot.mov = c(1, 2),
automatic = FALSE, al.mirror = c(0, 1), al.trap.rot = -45, al.dot.mov = 1)
## For plotting options, see the plot_fa examples.

## Create and plot four two-rule-based isomorphs, all of them comprising the same Figure A:
four <- build_fa(isomorphs = 4, a.main = 1, a.flip = FALSE, a.trap = 2, a.dot = 6,
mirror = 1, subtract = "R")
## For plotting options, see the plot_fa examples.

## Create and plot 16 isomorphs by constricting the main shape rotation rule:
five <- build_fa(isomorphs = 16, subtract = c(1, 4), constrict = "main")
## For plotting options, see the plot_fa examples.
```

plot_fa *Plot figural analogies.*

Description

plot_fa plots figural analogies by reading the information previously stored in an object of class 'fa_items' generated with build_fa.

Usage

```
plot_fa(
  items,
  which = 0,
  mode = "A",
  language = "E",
  language.dir = "A",
  form.int = "A",
  form.ext = "A",
  size.shape = 1,
  size.dot = 2,
  size.line = 1,
  size.q = 3.5,
  size.word = 1.2,
  info = T,
  sep = ",",
  directory = F,
  switch.from = 0,
  switch.to = 0
)
```

Arguments

items	An object of class 'fa_items' generated with function build_fa. No default.
which	A numeric vector designating which isomorph(s) to plot. Plot all by default.
mode	A character string designating plot mode "A", "B" or "C". Plot mode "A" by default.
language	A character string designating English ("E"), German ("D") or Spanish ("S") language. Default is "E".
language.dir	A character string designating language for output files. "A" by default selects all languages.
form.int	A character string designating the form from "A" to "D" of the internal main shape, or "R" for random. Default is "A".
form.ext	A character string designating the form from "A" to "D" of the trapezium, or "R" for random. Default is "A".
size.shape	A number designating the size of every shape. Default is 1.

size.dot	A number designating the size of every shape dot. Default is 2.
size.line	A number designating the thickness of every shape. Default is 1.
size.q	A number designating the size of the question mark. Default is 3.5.
size.word	A number designating the size of the verbal options. Default is 1.2.
info	Should the applied rules and correct answers be informed? True by default.
sep	Field separator character of the "Info.csv" file. The default ", " is recommended for English MS Office.
directory	A character string designating a folder in your PC where to store the isomorphs.
switch.from	Number 'p' designating an option from 1 to 8 to switch with 'q'.
switch.to	Number 'q' designating an option from 1 to 8 to switch with 'p'.

Details

Thorough information about the plot_fa function can be found in the cited research paper of Blum and Holling (2018). Make sure to read the PDF version of it, since it is clearer. Additional information can also be found on icar-project.com.

Value

A data frame containing rules applied and right answers when info = T by default, or an object of class 'fa_items' when which has length 1, its value is greater than 0 and both switch.from and switch.to are greater than 0.

Author(s)

Diego Blum <<blumworx@gmail.com>>

References

Blum, D., & Holling, H. (2018). Automatic generation of figural analogies with the IMak package. *Frontiers in psychology, 9*(1286), 1-13. <DOI:10.3389/fpsyg.2018.01286>

See Also

build_fa

Examples

```
## Create two isomorphs with one rule, and set the correct answer to 1:
one <- build_fa(isomorphs = 2, dot.mov = c(1, 2), correct = 1)
## Plot them:
plot_fa(one)
## Change the correct answer of item 2 from position 1 to position 2:
one <- plot_fa(one, which = 2, switch.from = 1, switch.to = 2)
## Choose a directory and save the items:
# dir1 <- "enter your new directory here"
# plot_fa(one, directory = dir1)
```

```
## Create four isomorphs with two rules:
two <- build_fa(isomorphs = 4, mirror = 1, trap.rot = c(90, 45))
## Plot them in German language:
plot_fa(two, language = "D")
## Plot only items 2 and 3 in Spanish and choose form "B" for the internal main shape:
plot_fa(two, language = "S", form.int = "B", which = c(2, 3))
## Choose a different directory and save these two items by keeping the latter configuration:
# dir2 <- "enter your new directory here"
# plot_fa(two, which = c(2, 3), language.dir = "S", form.int = "B", directory = dir2)

## Create 20 isomorphs with three rules. Set automatic = FALSE and affect the options:
three <- build_fa(isomorphs = 20, mirror = 1, trap.rot = c(90, 45), dot.mov = c(1, 2),
automatic = FALSE, al.mirror = c(0, 1), al.trap.rot = -45, al.dot.mov = 1)
## Plot them:
plot_fa(three)
## Plot each individual shape of item 13 in German language only:
plot_fa(three, which = 13, mode = "C", language = "D")
## Choose a different directory and save the item parts:
# dir3 <- "enter your new directory here"
# plot_fa(three, which = 13, mode = "C", language.dir = "D", directory = dir3)
```

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