Package 'audiometry'

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Type Package

Title Standard Conform Pure Tone Audiometry (PTA) Plots

Version 0.2.0

Author Bernhard Lehnert

Maintainer Bernhard Lehnert <bernhard.lehnert@med.uni-greifswald.de>

Description Facilitates plotting audiometric data (mostly) by preparing the coordinate system according to standards, given e. g. in American Speech-Language-Hearing Association (2005), <doi:10.1044/policy.GL2005-00014>.

Imports ggplot2

License GPL-3

Encoding UTF-8

LazyData true

RoxygenNote 7.1.0

Suggests knitr, rmarkdown, ggbeeswarm, ggthemes

VignetteBuilder knitr

NeedsCompilation no

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audiometry *audiometry*

Description

a package for standard confirm pur tone audiomety data visualisation using the versatile ggplot2 package.

Details

Right now this is almost only about the gg_pta function to start a ggplot with pure tone audiometry data so that the reference frame looks familiar to audiologists and ent doctors.

boltzmann *Boltzmann's function*

Description

s-shaped curve , used as discrimination function to draw the "normal" curves in the Freiburger Sprachtest. Given as y = (exp(-4*(L-L_50))*s_50)^-1 this is similar to a logistic regression result but with parameterization usefull here:

Usage

```
boltzmann(L, L_50 = 18.4, s_50 = 0.08)
```

Arguments

L	sound pressure level for which the intelligibility is to be computed
L_50	sound pressure level at 50% intelligibility
s_50	intelligibility at L_50, happens to be 8% in Freiburger Zahlentest and 5% in Freiburger Einsilbertest (values taken from S. Hoth, Der Freiburger Sprachtest, HNO 2016, 64:540-48).

Value

predicted intelligibility

Examples

```
# Freiburger Einsilbertest has L_50 = 29.3 dB and s_50 at 5 %/dB.
# Compute the expected intelligbility at 20, 30 and 40 dB SPL

boltzmann(L = c(20, 30, 40), L_50 = 29.3, s_50 = .05)
```

gg_freiburg *Freiburger Sprachtest data with ggplot2*

Description

Probably the most influential speech intelligibility test in German speaking countries. This function serves as a starting point for plotting data in way that reflects the usual representation of Freiburger Sprachtest results.

Usage

```
gg_freiburg(data = data.frame(), NC_alpha = 0.6, HV_color = "grey")
```

Arguments

data	a data.frame that is given to ggplot for initialization
NC_alpha	value between 0 and 1 defining how prominent the "normal" curves are.
HV_color	color of the Hörverlust-Scale in the middle of the diagram.

Value

a ggplot suitable for adding Freiburger Sprachtest data as geom_*

Examples

```
library(ggplot2)
id = gl(25,4)
gender=gl(2,25, label =c("Frauen", "M\u00e4nner"))
x = rep(c(35, 50, 65, 80), 25)
y = 100*boltzmann(jitter(x,3), 45, .03)
example <- data.frame(Patient=id, Geschlecht = gender, x=x, y=y)
p <- gg_freiburg(NC_alpha = 1, HV_color = "grey") +
        geom_boxplot(aes(x = x, y = y, group = x), example) +
        geom_line(aes(x = x, y = y, color = Geschlecht, group = id), example)
print(p)
```

gg_pta *Make a primer for pure tone audiograms with ggplot2*

Description

Call this to start building a plot based on pure tone audiometry.

Usage

```
gg_pta(
  data = data.frame(),
  theme = theme_light,
  lettermark = NULL,
  lettermarksize = 30,
  xlab = "Frequency in Hertz (Hz)",
  ylab = "Hearing Levels in Decibels (dB)",
  xlim = c(125, 8000),
  xbreaks = c(125, 250, 500, 1000, 2000, 4000, 8000),
  minor_xbreaks = c(750, 1500, 3000),
  x_base_lwd = 1,
  xlabels = c("125", "250", "500", "1000", "2000", "4000", "8000"),
  ylim = c(120, -10),
  yposition = "left"
)
```

Arguments

`data`	data.frame that contains the data, later to be added to the plot. If no such data.frame is available, can be data = data.frame(0)
`theme`	theme for plotting in ggplot2. Can be set to NULL. A different theme can always be added later
`lettermark`	either "R" or "L" or c("R", "L") to add a letter describing the left or right side (see lettermarksize)
`lettermarksize`	size of letter for lettermark
`xlab`	string containing the x axis label
`ylab`	string containing the y axis label
`xlim`	limits of the frequencies displayed at the x axis.
`xbreaks`	frequencies at which major line breaks should be drawn. Must be of same length as `xlabels`
`minor_xbreaks`	frequencies at which minor line breaks should be drawn
`x_base_lwd`	if positive, a line to mark the 0 dB threshold level is drawn, the line width of which is given by x_base_lwd. Set to -1 to turn the line of
`xlabels`	vector of strings as frequency axis labels. Must be of same length as `xbreaks`.
`ylim`	limits of the decibels on the y axis
`yposition`	side on which to label the y axis: either "right" or "left"

Details

This function is called instead of ggplot2::ggplot with a data.frame and will return a ggplot with fixed axes, fixed axis ratio, ...

Value

a ggplot with standard axis ratio, given axis etc. to add geoms to

Author(s)

Bernhard Lehnert

Examples

```
library(ggplot2)
fig1 <- gg_pta(data.frame())
print(fig1)

fig2 <- gg_pta(data.frame(), xlab="Frequency [Hz]", xlim=c(125,12000),
               xbreaks = c(125, 250, 500, 1000, 2000, 4000, 8000, 12000),
               xlabels = c("125", "250", "500", "1k", "2k", "4k", "8k", "12k"))
print(fig2)

expl <- data.frame(x=rep(c(500, 1000, 2000, 4000), 200),
                   y=5 + 70*rbeta(200,1,5))
fig3 <- gg_pta(expl, lettermark = "R",
               xlab="frecuencia", ylab="volumen") +
             geom_boxplot(aes(x=x, y=y, group=x)) +
             theme_grey()
print(fig3)
```

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