

Package ‘BayesianLaterality’

October 12, 2022

Type Package

Title Predict Brain Asymmetry Based on Handedness and Dichotic Listening

Version 0.1.1

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Description Functional differences between the cerebral hemispheres are a fundamental characteristic of the human brain. Researchers interested in studying these differences often infer underlying hemispheric dominance for a certain function (e.g., language) from laterality indices calculated from observed performance or brain activation measures. However, any inference from observed measures to latent (unobserved) classes has to consider the prior probability of class membership in the population. The provided functions implement a Bayesian model for predicting hemispheric dominance from observed laterality indices (Sorensen and Westerhausen, Laterality: Asymmetries of Body, Brain and Cognition, 2020, <[doi:10.1080/1357650X.2020.1769124](https://doi.org/10.1080/1357650X.2020.1769124)>).

License GPL-3

Encoding UTF-8

LazyData true

RoxygenNote 7.1.1

Depends R (>= 2.10)

Imports dplyr (>= 1.0.2), purrr (>= 0.3.4), rlang (>= 0.4.7), tidyr (>= 1.1.2), tmvtnorm (>= 1.4-10), Rdpack

Suggests roxygen2, testthat (>= 2.1.0)

RdMacros Rdpack

URL <https://github.com/LCBC-UiO/BayesianLaterality>

NeedsCompilation no

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Repository CRAN

Date/Publication 2021-08-08 20:30:01 UTC

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BayesianLaterality	<i>BayesianLaterality: Predict hemispheric dominance based on observed laterality measures.</i>
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Description

The BayesianLaterality package provides functionality for predicting hemispheric dominance based on observed laterality measures, using the Bayes classifier described in Sørensen and Westerhausen (2020). At the moment, the only function is [predict_dominance](#).

References

Sørensen Ø, Westerhausen R (2020). “From observed laterality to latent hemispheric differences: Revisiting the inference problem.” *Laterality*, **25**(5), 560–582. doi: [10.1080/1357650x.2020.1769124](https://doi.org/10.1080/1357650x.2020.1769124).

example_data1	<i>Example dataset with a single measurement of three individuals.</i>
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Description

Example dataset with a single measurement of three individuals.

Usage

```
example_data1
```

Format

An object of class `tbl_df` (inherits from `tbl`, `data.frame`) with 3 rows and 2 columns.

example_data2	<i>Example dataset with three measurements each on 100 individuals.</i>
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Description

Example dataset with three measurements each on 100 individuals.

Usage

```
example_data2
```

Format

An object of class `tbl_df` (inherits from `tbl`, `data.frame`) with 300 rows and 4 columns.

predict_dominance	<i>Predict hemispheric dominance</i>
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Description

Predict hemispheric dominance based on observed laterality measures, using the methods described in Sørensen and Westerhausen (2020).

Usage

```
predict_dominance(
  data,
  parameters = dplyr::tibble(dominance = rep(c("left", "right", "none"), each = 2),
    handedness = rep(c("left", "right"), 3), mean_li = c(10, 12, -24, -24, 0, 0), sd_li =
    c(24.9, 17, 24.9, 17, 22, 22), prob_dominance = c(0.65, 0.87, 0.35, 0.13, 0, 0)),
  truncation = c(-100, 100),
  icc = 0
)
```

Arguments

data	Data frame with the following columns: <ul style="list-style-type: none"> • listening: Score between -100 and 100. • handedness: "left" for adextral (non-right-handed) and "right" for dextral (right-handed) <p>In addition, an optional column named ID can be provided, giving the subject ID. If a subject has multiple measurements, the posterior based on all measurements is provided. If the ID column is missing, each row is assumed to be measured on a separate subject.</p>
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parameters	Data frame in which the first two columns specify combinations of hemispheric dominance and handedness and the last three columns specify the corresponding parameter values. In particular, the columns are defined as follows: <ul style="list-style-type: none"> • dominance: character specifying hemispheric dominance. • handedness: character specifying handedness. • mean_li: mean dichotic listening score. • sd_li: standard deviation of dichotic listening score. • prob_dominance: probability of hemispheric dominance given handedness.
truncation	Numeric vector with two elements specifying the lower and upper bounds for truncation of the normal distribution for dichotic listening scores.
icc	Intraclass correlation for repeated measurements on the same individual. Defaults to 0.

Value

The probability of left or right hemispheric dominance in additional columns of data.

References

Sørensen Ø, Westerhausen R (2020). “From observed laterality to latent hemispheric differences: Revisiting the inference problem.” *Laterality*, **25**(5), 560–582. doi: [10.1080/1357650x.2020.1769124](https://doi.org/10.1080/1357650x.2020.1769124).

Examples

```
# The package comes with two example datasets.
# The first contains single measurements on three subjects.
# We can first take a look at the data
example_data1
# Next, compute predictions.
# Since there is no ID column, predict_dominance() will print a message telling
# the user that the rows are assumed to contain observations from different subjects.
predict_dominance(example_data1)

# The next example dataset contains repeated measurements
example_data2

# We compute the predictions as before:
predict_dominance(example_data2)
```

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