Package: bain (via r-universe)

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Type Package

Title Bayes Factors for Informative Hypotheses

Version 0.2.12

Description Computes approximated adjusted fractional Bayes factors for equality, inequality, and about equality constrained hypotheses. For a tutorial on this method, see Hoijtink, Mulder, van Lissa, & Gu, (2019) <doi:10.1037/met0000201>. For applications in structural equation modeling, see: Van Lissa, Gu, Mulder, Rosseel, Van Zundert, & Hoijtink, (2021) <doi:10.1080/10705511.2020.1745644>. For the statistical underpinnings, see Gu, Mulder, and Hoijtink (2018) <doi:10.1111/bmsp.12110>; Hoijtink, Gu, & Mulder, J. (2019) <doi:10.1111/bmsp.12145>; Hoijtink, Gu, Mulder, & Rosseel, (2019) <doi:10.31234/osf.io/q6h5w>.

License GPL (>= 3)

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`bain` *Bayes factors for informative hypotheses*

Description

`bain` is an acronym for "Bayesian informative hypotheses evaluation". It uses the Bayes factor to evaluate hypotheses specified using equality and inequality constraints among (linear combinations of) parameters in a wide range of statistical models. A **tutorial** by Hoijtink, Mulder, van Lissa, and Gu (2018), was published in Psychological Methods. The preprint of that tutorial is available on PsyArxiv (doi:10.31234/osf.io/v3shc) or on the bain website at `https://informative-hypotheses.sites.uu.nl/software/bain/` **Users are advised to read the tutorial AND the vignette that is provided with this package before using** `bain`.

Usage

```
bain(x, hypothesis, fraction = 1, ...)
```

Arguments

`x`	An R object containing the outcome of a statistical analysis. Currently, the following objects can be processed: `lm()`, `t_test()`, `lavaan` objects created with the `sem()`, `cfa()`, and `growth()` functions, and named vector objects. See the vignette for elaborations.
`hypothesis`	A character string containing the informative hypotheses to evaluate. See the vignette for elaborations.

`fraction`	A number representing the fraction of information in the data used to construct the prior distribution. The default value 1 denotes the minimal fraction, 2 denotes twice the minimal fraction, etc. See the vignette for elaborations.
`...`	Additional arguments. See the vignette for elaborations.

Value

The main output resulting from analyses with `bain` are Bayes factors and posterior model probabilities associated with the hypotheses that are evaluated. See the **tutorial** and the **vignette** for further elaborations.

Author(s)

The main authors of the bain package are Xin Gu, Caspar van Lissa, Herbert Hoijtink and Joris Mulder with smaller contributions by Marlyne Bosman, Camiel van Zundert, and Fayette Klaassen. Contact information can be found on the bain website at https://informative-hypotheses.sites.uu.nl/software/bain/

References

For a tutorial on this method, see:

Hoijtink, H., Mulder, J., van Lissa, C., & Gu, X. (2019). A tutorial on testing hypotheses using the Bayes factor. *Psychological methods, 24*(5), 539. doi:10.1037/met0000201

For applications in structural equation modeling, see:

Van Lissa, C. J., Gu, X., Mulder, J., Rosseel, Y., Van Zundert, C., & Hoijtink, H. (2021). Teacher's corner: Evaluating informative hypotheses using the Bayes factor in structural equation models. *Structural Equation Modeling: A Multidisciplinary Journal, 28*(2), 292-301. doi:10.1080/10705511.2020.1745644.

For the statistical underpinnings, see:

Gu, Mulder, and Hoijtink (2018). Approximated adjusted fractional Bayes factors: A general method for testing informative hypotheses. *British Journal of Mathematical and Statistical Psychology, 71*(2), 229-261. doi:10.1111/bmsp.12110.

Hoijtink, H., Gu, X., & Mulder, J. (2019). Bayesian evaluation of informative hypotheses for multiple populations. *British Journal of Mathematical and Statistical Psychology, 72*(2), 219-243. doi:10.1111/bmsp.12145.

Hoijtink, H., Gu, X., Mulder, J., & Rosseel, Y. (2019). Computing Bayes factors from data with missing values. *Psychological Methods, 24*(2), 253. doi:10.31234/osf.io/q6h5w

Examples

```
# Evaluation of informative hypotheses for an ANOVA
# make a factor of variable site
sesamesim$site <- as.factor(sesamesim$site)
# execute an analysis of variance using lm() which, due to the -1, returns
# estimates of the means of postnumb per group
anov <- lm(postnumb~site-1,sesamesim)
# take a look at the estimated means and their names
```

```
coef(anov)
# set a seed value
set.seed(100)
# use the names to formulate and test hypotheses with bain
results <- bain(anov, "site1=site2=site3=site4=site5; site2>site5>site1>
site3>site4")
#
# SEE THE TUTORIAL AND VIGNETTE FOR MANY ADDITIONAL EXAMPLES
```

`bain_sensitivity` *Sensitivity analysis for bain*

Description

Conducts a sensitivity analysis for `bain`.

Usage

```
bain_sensitivity(x, hypothesis, fractions = 1, ...)
```

Arguments

`x`	An R object containing the outcome of a statistical analysis. Currently, the following objects can be processed: `lm()`, `t_test()`, `lavaan` objects created with the `sem()`, `cfa()`, and `growth()` functions, and named vector objects. See the vignette for elaborations.
`hypothesis`	A character string containing the informative hypotheses to evaluate. See the vignette for elaborations.
`fractions`	A number representing the fraction of information in the data used to construct the prior distribution. The default value 1 denotes the minimal fraction, 2 denotes twice the minimal fraction, etc. See the vignette for elaborations.
`...`	Additional arguments passed to `bain`.

Details

The Bayes factor for equality constraints is sensitive to a scaling factor applied to the prior distribution. The argument `fraction` adjusts this scaling factor. The function `bain_sensitivity` is a wrapper for `bain`, which accepts a vector for the `fractions` argument, and returns a list of bain results objects. A table with a sensitivity analysis for specific statistics can be obtained using the `summary()` function, which accepts the argument `summary(which_stat = ...)`. The available statistics are elements of the `$fit` table (Fit_eq, Com_eq, Fit_in, Com_in, Fit, Com, BF, PMPa, and PMPb), and elements of the `BFmatrix`, which can be accessed by matrix notation, e.g.: `summary(bain_sens, which_stat = "BFmatrix[1,2]")`.

Value

A data.frame of class "bain_sensitivity".

Examples

```
sesamesim$site <- as.factor(sesamesim$site)
res <- lm(sesamesim$postnumb~sesamesim$site-1)
set.seed(4583)
bain_sens <- bain_sensitivity(res, "site1=site2;
                                    site2>site5",
                                    fractions = c(1,2,3))
summary(bain_sens, which_stat = "BF.c")
summary(bain_sens, which_stat = "BFmatrix[1,2]")
```

---

kuiper2013 *The Effect of Prior Interaction on Trust*

Description

These data were published in Kuiper and colleagues (2013), who set out to aggregate evidence for the effect of prior interactions between partners on trust in (economic) exchange relations across four heterogeneous replication studies. Batenburg et al. (2003) analyzed survey data using linear regression with covariates; Buskens and Raub (2002) analyzed experimental data using linear regression; Buskens and Weesie (2000) used an experimental design with a binary outcome, analyzed using probit regression; and Buskens, Raub, and Van der Veer (2010) used a longitudinal experimental design, analyzing the data with a three-level logistic regression. These studies each provide a regression coefficient (beta) assessing the effect of past experience on trust, and its estimated sampling variance (squared standard error). The sample sizes (n) were derived from the original publications.

Usage

```
data(kuiper2013)
```

Format

A data frame with 4 rows and 4 variables.

Details

Study	character	Reference of the original publication.
beta	numeric	Regression coefficient for the effect of prior interaction on trust.
vi	numeric	Sampling variance of 'beta'.
n	integer	Sample size.

References

Kuiper, R. M., Buskens, V., Raub, W., & Hoijtink, H. (2013). Combining Statistical Evidence From Several Studies: A Method Using Bayesian Updating and an Example From Research on Trust Problems in Social and Economic Exchange. Sociological Methods & Research, 42(1), 60–81. <doi:10.1177/0049124112464867>

Batenburg, R. S., W. Raub, and C. Snijders. 2003. Contacts and Contracts: Temporal Embeddedness and the Contractual Behavior of Firms. Research in the Sociology of Organizations 20:135-88.

Buskens, V. and W. Raub. 2002. Embedded Trust: Control and Learning. Advances in Group Processes 19:167-202.

Buskens, V., W. Raub, and J. van der Veer. 2010. Trust in Triads: An Experimental Study. Social Networks 32:301-12.

Buskens, V. and J. Weesie. 2000. An Experiment on the Effects of Embeddedness in Trust Situations: Buying a Used Car. Rationality and Society 12:227-53.

`pbf` *Product Bayes Factor*

Description

The product Bayes factor (PBF) aggregates evidence for an informative hypothesis across conceptual replication studies without imposing assumptions about heterogeneity.

Usage

```
pbf(...)

## Default S3 method:
pbf(x, ...)

## S3 method for class 'numeric'
pbf(yi, vi, ni, hypothesis = "y = 0", ...)
```

Arguments

`...`	Additional arguments passed to ‘bain‘.
`x`	An object for which a method exists, see Details.
`yi`	Numeric vector with the observed effect sizes.
`vi`	Numeric vector with the observed sampling variances.
`ni`	Integer vector with the sample sizes.
`hypothesis`	A character string containing the informative hypotheses to evaluate.

Details

Currently, the argument ‘x‘ accepts either: * A list of ‘bain‘ objects, resulting from a call to ‘bain‘. * A list of model objects for which a ‘bain‘ method exists; in this case, ‘pbf‘ will call ‘bain‘ on these model objects before aggregating the Bayes factors.

Value

A ‘data.frame‘ of class ‘pbf‘.

References

Van Lissa, C. J., Kuiper, R. M., & Clapper, E. (2023, April 25). Aggregating evidence from conceptual replication studies using the product Bayes factor. doi:10.31234/osf.io/nvqpw

Examples

```
pbf(yi = c(-.33, .32, .39, .31),
    vi = c(.085, .034, .016, .071),
    ni = c(7, 10, 13, 20))
```

---

seBeta *Standard Errors and CIs for Standardized Regression Coefficients*

Description

Computes Normal Theory and ADF Standard Errors and CIs for Standardized Regression Coefficients

Usage

```
seBeta(
  X = NULL,
  y = NULL,
  cov.x = NULL,
  cov.xy = NULL,
  var.y = NULL,
  Nobs = NULL,
  alpha = 0.05,
  estimator = "ADF"
)
```

Arguments

X	Matrix of predictor scores.
y	Vector of criterion scores.
cov.x	Covariance or correlation matrix of predictors.
cov.xy	Vector of covariances or correlations between predictors and criterion.
var.y	Criterion variance.
Nobs	Number of observations.
alpha	Desired Type I error rate; default = .05.
estimator	’ADF’ or ’Normal’ confidence intervals - requires raw X and raw y; default = ’ADF’.

Value

cov.Beta	Normal theory or ADF covariance matrix of standardized regression coefficients.
se.Beta	standard errors for standardized regression coefficients.
alpha	desired Type-I error rate.
CI.Beta	Normal theory or ADF (1-alpha) intervals for standardized regression coefficients.
estimator	estimator = "ADF" or "Normal".

Author(s)

Jeff Jones and Niels Waller

References

Jones, J. A, and Waller, N. G. (2015). The Normal-Theory and Asymptotic Distribution-Free (ADF) covariance matrix of standardized regression coefficients: Theoretical extensions and finite sample behavior. Psychometrika, 80, 365-378.

Examples

```
set.seed(123)

R <- matrix(.5, 3, 3)
diag(R) <- 1
X <- sesamesim[, c("peabody", "prenumb", "postnumb")]
y <- sesamesim$age
results <- seBeta(X, y, Nobs = nrow(sesamesim), alpha = .05, estimator = 'ADF')
print(results, digits = 3)

library(MASS)

set.seed(123)

R <- matrix(.5, 3, 3)
diag(R) <- 1
X <- mvrnorm(n = 200, mu = rep(0, 3), Sigma = R, empirical = TRUE)
Beta <- c(.2, .3, .4)
y <- X %*% Beta + .64 * scale(rnorm(200))
results <- seBeta(X, y, Nobs = 200, alpha = .05, estimator = 'ADF')
print(results, digits = 3)
```

`sesamesim` *Simulated Sesame Street Data*

Description

This is a simulated counterpart of part of the Sesame Street data presented by Stevens (1996, Appendix A) concerning the effect of the first year of the Sesame street series on the knowledge of 240 children in the age range 34 to 69 months. We will use the following variables: sex; site of child's origin; setting in which Sesame Street is watched; age; whether or not the child is encouraged to watch; Peabody metal age score; score on numbers test before, after and in a follow up measurement; and scores on knowledge of body parts, letters, forms, numbers, relations, and classifications, both before and after watching Sesame Street for a year.

Usage

```
data(sesamesim)
```

Format

A data frame with 240 rows and 21 variables.

Details

sex	`integer`	Sex of the child; 1 = boy, 2 = girl
site	`integer`	Site of the child's origin; 1 = disadvantaged inner city, 2 = advantaged suburban , 3 = advantaged rura
setting	`integer`	Setting in which the child watches Sesame Street; 1 = at home, 2 = at school
age	`integer`	Age of the child in months
viewenc	`integer`	Whether or not the child is encouraged to watch Sesame Street; 0 = no, 1 = yes
peabody	`integer`	Peabody mental age score of the child; the higher the score the higher the mental age
prenumb	`integer`	score on a numbers test before watching Sesame Street for a year
postnumb	`integer`	score on a numbers test after watching Sesame Street for a year
funumb	`integer`	follow up numbers test score measured one year after postnumb
Bb	`integer`	Knowledge of body parts before
Bl	`integer`	Knowledge of letters before
Bf	`integer`	Knowledge of forms before
Bn	`integer`	Knowledge of numbers before
Br	`integer`	Knowledge of relations before
Bc	`integer`	Knowledge of classifications before
Ab	`integer`	Knowledge of body parts after
Al	`integer`	Knowledge of letters after
Af	`integer`	Knowledge of forms after
An	`integer`	Knowledge of numbers after
Ar	`integer`	Knowledge of relations after
Ac	`integer`	Knowledge of classifications after

References

Stevens, J. (1996). Applied Multivariate Statistics for the Social Sciences. Mahwah NJ: Lawrence Erlbaum.

`synthetic_dk` *Simulated data about morality and politics in Denmark*

Description

This is a simulated counterpart of data presented by Van Leeuwen and colleagues (2022) concerning associations between moral dispositions (measured using the Morality As Cooperation questionnaire, MAC; see Curry et al., 2019) and political orientation.

Usage

```
data(synthetic_dk)
```

Format

A data frame with 552 rows and 31 variables.

Details

sepa_soc_1	`numeric`	Item 1 of the Policy Attitudes social (PA-social) scale.
sepa_soc_2	`numeric`	Item 2 of the Policy Attitudes social (PA-social) scale.
sepa_soc_3	`numeric`	Item 3 of the Policy Attitudes social (PA-social) scale.
sepa_soc_4	`numeric`	Item 4 of the Policy Attitudes social (PA-social) scale.
sepa_soc_5	`numeric`	Item 5 of the Policy Attitudes social (PA-social) scale.
sepa_eco_1	`numeric`	Item 1 of the Policy Attitudes economic (PA-economic) scale.
sepa_eco_2	`numeric`	Item 2 of the Policy Attitudes economic (PA-economic) scale.
sepa_eco_3	`numeric`	Item 3 of the Policy Attitudes economic (PA-economic) scale.
sepa_eco_4	`numeric`	Item 4 of the Policy Attitudes economic (PA-economic) scale.
sepa_eco_5	`numeric`	Item 5 of the Policy Attitudes economic (PA-economic) scale.
fam_1	`numeric`	Item 1 of the MAC (family subscale) scale.
fam_2	`numeric`	Item 2 of the MAC (family subscale) scale.
fam_3	`numeric`	Item 3 of the MAC (family subscale) scale.
grp_1	`numeric`	Item 1 of the MAC (group subscale) scale.
grp_2	`numeric`	Item 2 of the MAC (group subscale) scale.
grp_3	`numeric`	Item 3 of the MAC (group subscale) scale.
rec_1	`numeric`	Item 1 of the MAC (reciprocity subscale) scale.
rec_2	`numeric`	Item 2 of the MAC (reciprocity subscale) scale.
rec_3	`numeric`	Item 3 of the MAC (reciprocity subscale) scale.
her_1	`numeric`	Item 1 of the MAC (heroism subscale) scale.
her_2	`numeric`	Item 2 of the MAC (heroism subscale) scale.
her_3	`numeric`	Item 3 of the MAC (heroism subscale) scale.
def_1	`numeric`	Item 1 of the MAC (deference subscale) scale.

def_2	numeric	Item 2 of the MAC (deference subscale) scale.
def_3	numeric	Item 3 of the MAC (deference subscale) scale.
fai_1	numeric	Item 1 of the MAC (fairness subscale) scale.
fai_2	numeric	Item 2 of the MAC (fairness subscale) scale.
fai_3	numeric	Item 3 of the MAC (fairness subscale) scale.
pro_1	numeric	Item 1 of the MAC (property subscale) scale.
pro_2	numeric	Item 2 of the MAC (property subscale) scale.
pro_3	numeric	Item 3 of the MAC (property subscale) scale.

References

Van Leeuwen, F., Van Lissa, C. J., Papakonstantinou, T., Petersen, M., & Curry, O. S. (2022, May 25). Morality as Cooperation, Politics as Conflict. <doi:10.31234/osf.io/wm6rk>

Curry, O. S., Chesters, M. J., & Van Lissa, C. J. (2019). Mapping morality with a compass: Testing the theory of 'morality-as-cooperation' with a new questionnaire. Journal of Research in Personality, 78, 106-124.

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synthetic_nl *Simulated data about morality and politics in The Netherlands*

Description

This is a simulated counterpart of data presented by Van Leeuwen and colleagues (2022) concerning associations between moral dispositions (measured using the Morality As Cooperation questionnaire, MAC; see Curry et al., 2019) and political orientation.

Usage

```
data(synthetic_nl)
```

Format

A data frame with 401 rows and 38 variables.

Details

sepa_soc_1	numeric	Item 1 of the Policy Attitudes social (PA-social) scale.
sepa_soc_2	numeric	Item 2 of the Policy Attitudes social (PA-social) scale.
sepa_soc_3	numeric	Item 3 of the Policy Attitudes social (PA-social) scale.
sepa_soc_4	numeric	Item 4 of the Policy Attitudes social (PA-social) scale.
sepa_soc_5	numeric	Item 5 of the Policy Attitudes social (PA-social) scale.
sepa_eco_1	numeric	Item 1 of the Policy Attitudes economic (PA-economic) scale.
sepa_eco_2	numeric	Item 2 of the Policy Attitudes economic (PA-economic) scale.

sepa_eco_3	numeric	Item 3 of the Policy Attitudes economic (PA-economic) scale.
sepa_eco_4	numeric	Item 4 of the Policy Attitudes economic (PA-economic) scale.
sepa_eco_5	numeric	Item 5 of the Policy Attitudes economic (PA-economic) scale.
secs_soc_1	numeric	Item 1 of the Social and Economic Conservatism Scale (social subscale) scale.
secs_soc_2	numeric	Item 2 of the Social and Economic Conservatism Scale (social subscale) scale.
secs_soc_3	numeric	Item 3 of the Social and Economic Conservatism Scale (social subscale) scale.
secs_soc_4	numeric	Item 4 of the Social and Economic Conservatism Scale (social subscale) scale.
secs_soc_5	numeric	Item 5 of the Social and Economic Conservatism Scale (social subscale) scale.
secs_soc_6	numeric	Item 6 of the Social and Economic Conservatism Scale (social subscale) scale.
secs_soc_7	numeric	Item 7 of the Social and Economic Conservatism Scale (social subscale) scale.
fam_1	numeric	Item 1 of the MAC (family subscale) scale.
fam_2	numeric	Item 2 of the MAC (family subscale) scale.
fam_3	numeric	Item 3 of the MAC (family subscale) scale.
grp_1	numeric	Item 1 of the MAC (group subscale) scale.
grp_2	numeric	Item 2 of the MAC (group subscale) scale.
grp_3	numeric	Item 3 of the MAC (group subscale) scale.
rec_1	numeric	Item 1 of the MAC (reciprocity subscale) scale.
rec_2	numeric	Item 2 of the MAC (reciprocity subscale) scale.
rec_3	numeric	Item 3 of the MAC (reciprocity subscale) scale.
her_1	numeric	Item 1 of the MAC (heroism subscale) scale.
her_2	numeric	Item 2 of the MAC (heroism subscale) scale.
her_3	numeric	Item 3 of the MAC (heroism subscale) scale.
def_1	numeric	Item 1 of the MAC (deference subscale) scale.
def_2	numeric	Item 2 of the MAC (deference subscale) scale.
def_3	numeric	Item 3 of the MAC (deference subscale) scale.
fai_1	numeric	Item 1 of the MAC (fairness subscale) scale.
fai_2	numeric	Item 2 of the MAC (fairness subscale) scale.
fai_3	numeric	Item 3 of the MAC (fairness subscale) scale.
pro_1	numeric	Item 1 of the MAC (property subscale) scale.
pro_2	numeric	Item 2 of the MAC (property subscale) scale.
pro_3	numeric	Item 3 of the MAC (property subscale) scale.

References

Van Leeuwen, F., Van Lissa, C. J., Papakonstantinou, T., Petersen, M., & Curry, O. S. (2022, May 25). Morality as Cooperation, Politics as Conflict. <doi:10.31234/osf.io/wm6rk>

Curry, O. S., Chesters, M. J., & Van Lissa, C. J. (2019). Mapping morality with a compass: Testing the theory of 'morality-as-cooperation'with a new questionnaire. Journal of Research in Personality, 78, 106-124.

`synthetic_us` *Simulated data about morality and politics in the USA*

Description

This is a simulated counterpart of data presented by Van Leeuwen and colleagues (2022) concerning associations between moral dispositions (measured using the Morality As Cooperation questionnaire, MAC; see Curry et al., 2019) and political orientation.

Usage

```
data(synthetic_us)
```

Format

A data frame with 518 rows and 33 variables.

Details

secs_soc_1	numeric	Item 1 of the Social and Economic Conservatism Scale (social subscale) scale.
secs_soc_2	numeric	Item 2 of the Social and Economic Conservatism Scale (social subscale) scale.
secs_soc_3	numeric	Item 3 of the Social and Economic Conservatism Scale (social subscale) scale.
secs_soc_4	numeric	Item 4 of the Social and Economic Conservatism Scale (social subscale) scale.
secs_soc_5	numeric	Item 5 of the Social and Economic Conservatism Scale (social subscale) scale.
secs_soc_6	numeric	Item 6 of the Social and Economic Conservatism Scale (social subscale) scale.
secs_soc_7	numeric	Item 7 of the Social and Economic Conservatism Scale (social subscale) scale.
secs_eco_1	numeric	Item 1 of the Social and Economic Conservatism Scale (economic subscale) scale.
secs_eco_2	numeric	Item 2 of the Social and Economic Conservatism Scale (economic subscale) scale.
secs_eco_3	numeric	Item 3 of the Social and Economic Conservatism Scale (economic subscale) scale.
secs_eco_4	numeric	Item 4 of the Social and Economic Conservatism Scale (economic subscale) scale.
secs_eco_5	numeric	Item 5 of the Social and Economic Conservatism Scale (economic subscale) scale.
fam_1	numeric	Item 1 of the MAC (family subscale) scale.
fam_2	numeric	Item 2 of the MAC (family subscale) scale.
fam_3	numeric	Item 3 of the MAC (family subscale) scale.
grp_1	numeric	Item 1 of the MAC (group subscale) scale.
grp_2	numeric	Item 2 of the MAC (group subscale) scale.
grp_3	numeric	Item 3 of the MAC (group subscale) scale.
rec_1	numeric	Item 1 of the MAC (reciprocity subscale) scale.
rec_2	numeric	Item 2 of the MAC (reciprocity subscale) scale.
rec_3	numeric	Item 3 of the MAC (reciprocity subscale) scale.
her_1	numeric	Item 1 of the MAC (heroism subscale) scale.
her_2	numeric	Item 2 of the MAC (heroism subscale) scale.
her_3	numeric	Item 3 of the MAC (heroism subscale) scale.
def_1	numeric	Item 1 of the MAC (deference subscale) scale.
def_2	numeric	Item 2 of the MAC (deference subscale) scale.
def_3	numeric	Item 3 of the MAC (deference subscale) scale.
fai_1	numeric	Item 1 of the MAC (fairness subscale) scale.
fai_2	numeric	Item 2 of the MAC (fairness subscale) scale.
fai_3	numeric	Item 3 of the MAC (fairness subscale) scale.
pro_1	numeric	Item 1 of the MAC (property subscale) scale.
pro_2	numeric	Item 2 of the MAC (property subscale) scale.
pro_3	numeric	Item 3 of the MAC (property subscale) scale.

References

Van Leeuwen, F., Van Lissa, C. J., Papakonstantinou, T., Petersen, M., & Curry, O. S. (2022, May 25). Morality as Cooperation, Politics as Conflict. <doi:10.31234/osf.io/wm6rk>

Curry, O. S., Chesters, M. J., & Van Lissa, C. J. (2019). Mapping morality with a compass: Testing the theory of 'morality-as-cooperation'with a new questionnaire. Journal of Research in Personality, 78, 106-124.

`t_test` *Student's t-test*

Description

This function is a wrapper for the function `t.test`, which returns group-specific sample sizes and variances, in addition to the usual output of `t.test`.

Usage

```
t_test(x, ...)
```

Arguments

`x`	An object for which an S3 method of t.test exists (vector or formula).
`...`	arguments passed to `t.test`.

Details

This wrapper allows users to enjoy the functionality of bain with the familiar interface of the stats-function t.test.

For more documentation, see `t.test`.

Value

A list with class `"t_test"` containing the following components:

`statistic`	the value of the t-statistic.
`parameter`	the degrees of freedom for the t-statistic.
`p.value`	the p-value for the test.
`conf.int`	a confidence interval for the mean appropriate to the specified alternative hypothesis.
`estimate`	the estimated mean or difference in means depending on whether it was a one-sample test or a two-sample test.
`null.value`	the specified hypothesized value of the mean or mean difference depending on whether it was a one-sample test or a two-sample test.

alternative	a character string describing the alternative hypothesis.
method	a character string indicating what type of t-test was performed.
data.name	a character string giving the name(s) of the data.
v	The variance or group-specific variances.
n	The sample size, or group-specific sample size.

See Also

t.test

Examples

```
tmp <- t_test(extra ~ group, data = sleep)
tmp$n
tmp$v
tmp2 <- t_test(extra ~ group, data = sleep)
tmp2$n
tmp2$v
tmp <- t_test(Pair(sleep$extra[sleep$group == 1], sleep$extra[sleep$group == 2]) ~ 1)
tmp$n
tmp$v
t_test(sesamesim$postnumb)
tmp <- t_test(sesamesim$prenumb)
tmp$n
tmp$v
tmp2 <- t_test(sesamesim$prenumb)
tmp2$n
tmp2$v
tmp <- t_test(sesamesim$prenumb, sesamesim$postnumb)
tmp$n
tmp$v
tmp2 <- t_test(sesamesim$prenumb, sesamesim$postnumb)
tmp2$n
tmp2$v
tmp <- t_test(sesamesim$prenumb, sesamesim$postnumb, paired = TRUE)
tmp$n
tmp$v
tmp2 <- t_test(sesamesim$prenumb, sesamesim$postnumb, paired = TRUE)
tmp2$n
tmp2$v
```

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