Package 'sate'

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Type Package

Title Scientific Analysis of Trial Errors (SATE)

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Description Bundles functions used to analyze the harmfulness of trial errors in criminal trials.
Functions in the Scientific Analysis of Trial Errors ('SATE') package help users estimate the
probability that a jury will find a defendant guilty given jurors' preferences for a guilty
verdict and the uncertainty of that estimate. Users can also compare actual and hypothetical
trial conditions to conduct harmful error analysis. The relationship between individual jurors'
verdict preferences and the probability that a jury returns a guilty verdict has been studied
by Davis (1973) <doi:10.1037/h0033951>; MacCoun & Kerr (1988) <doi:10.1037/0022-
3514.54.1.21>,
and Devine et el. (2001) <doi:10.1037/1076-8971.7.3.622>, among others.

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Imports stats, ellipse, graphics, MASS

RoxygenNote 7.2.3

NeedsCompilation no

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R topics documented:

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as.jury.point   *Calculates probability a jury will find defendant guilty based on juror*
                                 preferences

Description

Calculates probability jury finds defendant guilty based on verdict preferences of jury pool. Does
not estimate uncertainty (use as.jury.stats function for inferential statistics).

Usage

```
as.jury.point(
  sample_pg,
  jury_n = 12,
  pstrikes = 0,
  dstrikes = 0,
  accuracy = 0.15
)
```

Arguments

sample_pg   Proportion of jurors who favor a guilty verdict; a number between 0 and 1.

jury_n   Size of the jury (i.e. 6, 8, or 12); default value is 12.

pstrikes   Number of peremptory strikes by prosecution; default value is 0.

dstrikes   Number of peremptory strikes by defendant; default value is 0.

accuracy   Accuracy of parties' peremptory strikes; a number between 0 and 1; default
                 value is .15.

Value

Returns the probability jury finds defendant guilty.

Examples

```
library(sate)
as.jury.point(sample_pg = .50)

as.jury.point(sample_pg = 10/12)
```

`as.jury.stats`	*Calculates probability a jury will find defendant guilty based on juror preferences, with standard error and confidence interval*

Description

Calculates probability jury finds defendant guilty based on verdicts preferences of jury pool. Also reports standard error and confidence interval of estimate (use as.jury.point function for estimate only).

Usage

```
as.jury.stats(
  sample_pg,
  sample_n,
  jury_n = 12,
  pstrikes = 0,
  dstrikes = 0,
  accuracy = 0.15,
  digits = 3
)
```

Arguments

`sample_pg`	Proportion of jurors who favor a guilty verdict; a number between 0 and 1.
`sample_n`	Size of sample used to estimate sample_pg.
`jury_n`	Size of the jury (i.e. 6, 8, or 12); default value is 12.
`pstrikes`	Number of peremptory strikes by prosecution; default value is 0.
`dstrikes`	Number of peremptory strikes by defendant; default value is 0.
`accuracy`	Accuracy of parties' peremptory strikes; a number between 0 and 1; default value is .15.
`digits`	Number of digits to report after decimal places; default value is 3.

Value

Returns the probability jury finds defendant guilty.

Examples

```
library(sate)
as.jury.stats(sample_pg=.50, sample_n=830)

as.jury.stats(sample_pg=10/12, sample_n=295)
```

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compare.jury.stats   *Estimates jury-level differences based on juror-level statistics with inferential statistics*

Description

Calculates jury-level differences based on juror-level statistics supplied by user.

Usage

```
compare.jury.stats(
  pg_actual,
  n_actual,
  pg_hypo,
  n_hypo,
  jury_n = 12,
  pstrikes = 0,
  dstrikes = 0,
  accuracy = 0.15,
  digits = 3
)
```

Arguments

pg_actual	The proportion of jurors who favor a guilty verdict in the actual trial condition (the trial with error).
n_actual	The size of the sample used to estimate pg_actual.
pg_hypo	The proportion of jurors who favor a guilty verdict in the hypothetical trial condition (the fair trial without error).
n_hypo	The size of the sample used to estimate pg_hypo.
jury_n	Size of the jury (i.e. 6, 8, or 12); default value is 12.
pstrikes	Number of peremptory strikes by prosecution; default value is 0.
dstrikes	Number of peremptory strikes by defendant; default value is 0.
accuracy	Accuracy of parties' peremptory strikes; a number between 0 and 1; default value is .15.
digits	Number of digits to report after decimal places; default value is 3.

Value

Returns a list of jury-level statistics to assess effect of a trial error.

Examples

```
library(sate)
compare.jury.stats(pg_actual=.70, n_actual=400, pg_hypo=.60, n_hypo=450)

compare.jury.stats(pg_actual=.75, n_actual=450, pg_hypo=.65, n_hypo=350,
                   jury_n=6, pstrikes=3, dstrikes=3)
```

---

deliberate *Deliberation function*

Description

The deliberate function returns a jury verdict based on a simulation of deliberation as a modified tug-of-war between two verdict factions. Can be called directly, but is meant to be called many times to generate verdict probabilities based on g_votes and jury_n values.

Usage

```
deliberate(g_votes, jury_n)
```

Arguments

g_votes   Initial number of votes for guilty verdict (same as K value).

jury_n   Size of the jury (i.e. 4, 6, 8, 12, or 16).

Value

Returns "G" (guilty verdict) or "NG" (not guilty verdict).

Examples

```
library(sate)
deliberate(g_votes=10, jury_n=12)

deliberate(g_votes=4, jury_n=6)
```

---

deliberate.civil   *Deliberation function for civil trials (proposed)*

Description

The deliberate function returns a jury verdict based on a simulation of deliberation as a tug-of-war between two verdict factions. The civil version of deliberate does not have presumption in favor of either party. Can be called directly, but is meant to be called many times to generate verdict probabilities based on p_votes and jury_n values.

Usage

```
deliberate.civil(p_votes, jury_n)
```

Arguments

p_votes   Initial number of votes for plaintiff.

jury_n   Size of the jury (i.e. 4, 6, 8, 12, or 16).

Value

Returns "P" (plaintiff verdict) or "D" (defendant verdict).

Examples

```
library(sate)
deliberate.civil(p_votes=8, jury_n=12)

deliberate.civil(p_votes=5, jury_n=6)
```

---

graph.effect.defendant

                    *Plots jury-level differences based on juror-level statistics with effect-
                    on-defendant displayed*

Description

Plots jury-level differences based on juror-level statistics supplied by user. Point estimates supplemented by confidence intervals. Effect-on-defendant also plotted.

Usage

```
graph.effect.defendant(
  pg_actual,
  n_actual,
  pg_hypo,
  n_hypo,
  jury_n = 12,
  pstrikes = 0,
  dstrikes = 0,
  accuracy = 0.15
)
```

Arguments

pg_actual	The proportion of jurors who favor a guilty verdict in the actual trial condition (the trial with error).
n_actual	The size of the sample used to estimate pg_actual.
pg_hypo	The proportion of jurors who favor a guilty verdict in the hypothetical trial condition (the fair trial without error).
n_hypo	The size of the sample used to estimate pg_hypo.
jury_n	Size of the jury (i.e. 6, 8, or 12); default value is 12.
pstrikes	Number of peremptory strikes by prosecution; default value is 0.
dstrikes	Number of peremptory strikes by defendant; default value is 0.
accuracy	Accuracy of parties' peremptory strikes; a number between 0 and 1; default value is .15.

Value

No return (creates plots)

Examples

```
library(sate)
graph.effect.defendant(pg_actual=.70, n_actual=400, pg_hypo=.60, n_hypo=450)

graph.effect.defendant(pg_actual=.75, n_actual=450, pg_hypo=.65, n_hypo=350,
                       jury_n=6, pstrikes=3, dstrikes=3)
```

---

graph.estimate	*Plots probability of a guilty verdict with confidence interval based on juror-level statistics*

Description

Plots probability of guilty verdict with confidence interval based on juror-level statistics supplied by user. Similar to graph.effect.defendant, but plots one condition.

Usage

```
graph.estimate(
  sample_pg,
  sample_n,
  jury_n = 12,
  pstrikes = 0,
  dstrikes = 0,
  accuracy = 0.15
)
```

Arguments

sample_pg	The proportion of jurors who favor a guilty verdict in the sample condition
sample_n	The size of the sample used to estimate sample_pg_actual
jury_n	Size of the jury (i.e. 6, 8, or 12); default value is 12.
pstrikes	Number of peremptory strikes by prosecution; default value is 0.
dstrikes	Number of peremptory strikes by defendant; default value is 0.
accuracy	Accuracy of parties' peremptory strikes; a number between 0 and 1; default value is .15.

Value

No return (creates plot)

Examples

```
library(sate)
graph.estimate(sample_pg=.70, sample_n=400)

graph.estimate(sample_pg=.75, sample_n=450, jury_n=6, pstrikes=3, dstrikes=3)
```

---

select.with.strikes   *Generates the distribution of initial votes for guilty verdict on juries*

Description

Calculates and returns probability distribution of initial votes for guilty verdict from 0:jury_n with options for peremptory strikes and strike accuracy

Usage

```
select.with.strikes(
  p_g,
  jury_n = 12,
  pstrikes = 0,
  dstrikes = 0,
  accuracy = 0.15
)
```

Arguments

p_g	The proportion of jurors in the jury pool who favor a guilty verdict
jury_n	Size of the jury (i.e. 6, 8, or 12); default value is 12.
pstrikes	Number of peremptory strikes by prosecution; default value is 0.
dstrikes	Number of peremptory strikes by defendant; default value is 0.
accuracy	Accuracy of parties' peremptory strikes; a number between 0 and 1; default value is .15.

Value

A vector of probabilities for 0:jury_n initial guilty votes

Examples

```
library(sate)
select.with.strikes(p_g=.70, jury_n=6)

select.with.strikes(p_g=.75, jury_n=12, pstrikes=6, dstrikes=10)
```

---

sim.as.jury.stats	*Estimates jury-level probability of guilty verdict based on juror-level statistics based on empirical data*

Description

Returns estimate of the probability of guilty verdict based on juror-level statistics supplied by user. Also reports inferential statistics. Results are based on an empirical model with greater uncertainty than as.jury.stats function.

Usage

```
sim.as.jury.stats(
  sample_pg,
  sample_n,
  jury_n = 12,
  pstrikes = 0,
  dstrikes = 0,
  accuracy = 0.15,
  digits = 3,
  nDraws = 10000,
  seed = 12345
)
```

Arguments

sample_pg	The proportion of jurors who favor a guilty verdict in the jury pool
sample_n	The size of the sample used to estimate sample_pg
jury_n	Size of the jury (i.e. 6, 8, or 12); default value is 12.
pstrikes	Number of peremptory strikes by prosecution; default value is 0.
dstrikes	Number of peremptory strikes by defendant; default value is 0.
accuracy	Accuracy of parties' peremptory strikes; a number between 0 and 1; default value is .15.
digits	Number of digits to report after decimal places; default value is 3.
nDraws	The number of simulations used to generate results. Should be very large number (default = 10000).
seed	Set seed for random number generation for replication, default is 12345.

Value

Returns a list of jury-level statistics to assess effect of a trial error.

Examples

```
library(sate)
sim.as.jury.stats(sample_pg=.50, sample_n=830, nDraws=500)

sim.as.jury.stats(sample_pg=10/12, sample_n=295, pstrikes=6, dstrikes=10, nDraws=1000)
```

---

sim.compare.jury.stats

Estimates jury-level differences based on juror-level statistics using simulations based on empirical data

---

Description

Calculates jury-level differences based on juror-level statistics supplied by user. Results based on empirical data, inferential statistics produced via simulations.

Usage

```
sim.compare.jury.stats(
  pg_actual,
  n_actual,
  pg_hypo,
  n_hypo,
  jury_n = 12,
  digits = 3,
  pstrikes = 0,
  dstrikes = 0,
```

```
    accuracy = 0.15,
    seed = 12345,
    nDraws = 10000
)
```

Arguments

pg_actual	The proportion of jurors who favor a guilty verdict in the actual trial condition (the trial with error).
n_actual	The size of the sample used to estimate pg_actual.
pg_hypo	The proportion of jurors who favor a guilty verdict in the hypothetical trial condition (the fair trial without error).
n_hypo	The size of the sample used to estimate pg_hypo.
jury_n	Size of the jury (i.e. 6, 8, or 12); default value is 12.
digits	Number of digits to report after decimal places; default value is 3.
pstrikes	Number of peremptory strikes by prosecution; default value is 0.
dstrikes	Number of peremptory strikes by defendant; default value is 0.
accuracy	Accuracy of parties' peremptory strikes; a number between 0 and 1; default value is .15.
seed	Set seed for random number generation for replication, default is 12345.
nDraws	The number of simulations used to generate results. Should be very large number (default = 10000).

Value

Returns a list of jury-level statistics to assess effect of a trial error.

Examples

```
    library(sate)
  sim.compare.jury.stats(pg_actual=.70, n_actual=400, pg_hypo=.60, n_hypo=450, nDraws=500)

    sim.compare.jury.stats(pg_actual=.75, n_actual=450, pg_hypo=.65, n_hypo=350,
                    seed=12345, nDraws=1000)
```

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