

Package ‘SimSST’

January 9, 2023

Title Simulated Stop Signal Task Data

Version 0.0.5.2

Description Stop signal task data of go and stop trials is generated per participant. The simulation process is based on the generally non-independent horse race model and fixed stop signal delay or tracking method. Each of go and stop process is assumed having exponentially modified Gaussian(ExG) or Shifted Wald (SW) distributions. The output data can be converted to 'BEESTS' software input data enabling researchers to test and evaluate various brain stopping processes manifested by ExG or SW distributional parameters of interest. Methods are described in: Soltanifar M (2020) <<https://hdl.handle.net/1807/101208>>, Matzke D, Love J, Wiecki TV, Brown SD, Logan GD and Wagenmakers E-J (2013) <[doi:10.3389/fpsyg.2013.00918](https://doi.org/10.3389/fpsyg.2013.00918)>, Logan GD, Van Zandt T, Verbruggen F, Wagenmakers EJ. (2014) <[doi:10.1037/a0035230](https://doi.org/10.1037/a0035230)>.

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Encoding UTF-8

RoxygenNote 7.1.2

Imports dplyr, gamlss.dist, MASS, stats

Suggests knitr, rmarkdown

VignetteBuilder knitr

NeedsCompilation no

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 simssfired

Simulating SSRT data using fixed SSD methods

Description

Stop signal task data of go and stop trials is generated per participant. The fixed stop signal delay method with underlying exponentially modified Gaussian (ExG) or Shifted Wald (SW) distributions for each of go and stop process is applied. The output data can be converted to 'BEESTS' software input data enabling researchers to test and evaluate different distributional parameters of interest.

Usage

```
simssfired(pid, block, n, m, SSD.b, dist.go, theta.go, dist.stop, theta.stop)
```

Arguments

| | |
|------------|---|
| pid | character vector of size b of participant |
| block | numeric vector of size b blocks |
| n | numeric vector of size b of total number of trials |
| m | numeric vector of size b of total number of stops |
| SSD.b | numeric vector of size b of stop signal delay |
| dist.go | character vector of size b of distribution of go trials, either ExG or SW |
| theta.go | numeric matrix of size b by columns of mu.go, sigma.go, and tau.go |
| dist.stop | character vector of size b of distribution of stop.trials, either ExG or SW |
| theta.stop | numeric matrix of size b by columns of mu.stop, sigma.stop, and tau.stop |

Value

matrix with $\text{sum}(n)$ rows and 8 columns

References

Gordon D. Logan. On the Ability to Inhibit Thought and Action: A User's Guide to the Stop Signal Paradigm. In D. Dagenbach, & T.H. Carr (Eds.), *Inhibitory Process in Attention, Memory and Language*. San Diego: Academic Press, 1994.

Dora Matzke, Jonathon Love, Thomas V. Wiecki, Scott D. Brown, and et al. Release the BEESTS: Bayesian Estimation of Ex-Gaussian Stop Signal Reaction Times Distributions. *Frontiers in Psychology*, 4: Article 918, 2013.

Mohsen Soltanifar. *Stop Signal Reaction Times: New Estimations with Longitudinal, Bayesian and Time Series based Methods*, PhD Dissertation, Biostatistics Division, Dalla Lana School of Public Health, University of Toronto, Toronto, Canada, 2020.

Examples

```
mySSTdata1 <- simssfixed(
  pid = c("John.Smith", "Jane.McDonald", "Jane.McDonald"),
  n = c(50, 100, 150), m=c(10, 20, 30), SSD.b=c(200, 220, 240),
  dist.go=c("ExG", "ExG", "ExG"),
  theta.go=as.matrix(rbind(c(400, 60, 30), c(440, 90, 90), c(440, 90, 90))),
  dist.stop=c("ExG", "ExG", "ExG"),
  theta.stop=as.matrix(rbind(c(100, 70, 60), c(120, 80, 70), c(120, 80, 70))),
  block=c(1, 1, 2))
mySSTdata1
```

simssgen

*Simulating correlated SST data using general tracking method***Description**

Stop signal task data of go and stop trials is generated per participant. The tracking signal delay method with underlying exponentially modified Gaussian(ExG) or Shifted Wald(SW) distributions for each of go and stop process is applied. The output data can be converted to 'BEESTS' software input data enabling researchers to test and evaluate different distributional parameters of interest.

Usage

```
simssgen(
  pid,
  block,
  n,
  m,
  SSD.b,
  dist.go,
  theta.go,
  dist.stop,
  theta.stop,
  rho,
  d
)
```

Arguments

| | |
|---------|---|
| pid | a character vector of size b of participant |
| block | a numeric vector of size b blocks |
| n | a numeric vector of size b of total number of trials |
| m | a numeric vector of size b of total number of stops |
| SSD.b | a numeric vector of size b of starting stop signal delay |
| dist.go | a character vector of size b of distribution of go trials, either ExG or SW |

| | |
|------------|--|
| theta.go | a numeric matrix of size b by columns mu.go, sigma.go, tau.go |
| dist.stop | a character vector of size b of distribution of stop.trials, either ExG or SW |
| theta.stop | a numeric matrix of size b by columns mu.stop, sigma.stop, tau.stop |
| rho | a numeric vector of size b of Spearman correlation between GORT and SSRT in range -1 to +1 |
| d | a numeric vector of size b of added constant value to subsequent stop trials SSD |

Value

a matrix with $\text{sum}(n)$ rows and (8) columns

References

Gordon D. Logan. On the Ability to Inhibit Thought and Action: A User's Guide to the Stop Signal Paradigm. In D. Dagenbach, & T.H. Carr (Eds.), *Inhibitory Process in Attention, Memory and Language*. San Diego: Academic Press, 1994.

Dora Matzke, Jonathon Love, Thomas V. Wiecki, Scott D. Brown, and et al. Release the BEESTS: Bayesian Estimation of Ex-Gaussian Stop Signal Reaction Times Distributions. *Frontiers in Psychology*, 4: Article 918, 2013.

Mohsen Soltanifar. Stop Signal Reaction Times: New Estimations with Longitudinal, Bayesian and Time Series based Methods, PhD Dissertation, Biostatistics Division, Dalla Lana School of Public Health, University of Toronto, Toronto, Canada, 2020.

Examples

```
mySSTdata1 <- simssgen(
  pid = c("John.Smith", "Jane.McDonald", "Jane.McDonald"),
  block = c(1,1,2),
  n = c(50,100,150),
  m = c(10,20,30),
  SSD.b = c(200,220,240),
  dist.go = c("ExG", "ExG", "ExG"),
  theta.go = as.matrix(rbind(c(400, 60, 30), c(440, 90, 90), c(440, 90, 90))),
  dist.stop = c("ExG", "ExG", "ExG"),
  theta.stop = as.matrix(rbind(c(100, 70, 60), c(120, 80, 70), c(120, 80, 70))),
  rho = c(0.35, 0.45, 0.45),
  d = c(50, 65, 75))
mySSTdata1
```

Description

Stop signal task data of go and stop trials is generated per participant. The tracking signal delay method with underlying exponentially modified Gaussian(ExG) or Shifted Wald(SW) distributions for each of go and stop process is applied. The output data can be converted to 'BEESTS' software input data enabling researchers to test and evaluate different distributional parameters of interest.

Usage

```
simsstrack(pid, block, n, m, SSD.b, dist.go, theta.go, dist.stop, theta.stop)
```

Arguments

| | |
|------------|---|
| pid | a character vector of size b of participant |
| block | a numeric vector of size b blocks |
| n | a numeric vector of size b of total number of trials |
| m | a numeric vector of size b of total number of stops |
| SSD.b | a numeric vector of size b of starting stop signal delay |
| dist.go | a character vector of size b of distribution of go trials, either ExG or SW |
| theta.go | a numeric matrix of size b by columns mu.go, sigma.go, tau.go |
| dist.stop | a character vector of size b of distribution of stop.trials, either ExG or SW |
| theta.stop | a numeric matrix of size b by columns mu.stop, sigma.stop, tau.stop |

Value

a matrix with $\text{sum}(n)$ rows and (8) columns

References

Gordon D. Logan. On the Ability to Inhibit Thought and Action: A User's Guide to the Stop Signal Paradigm. In D. Dagenbach, & T.H. Carr (Eds.), *Inhibitory Process in Attention, Memory and Language*. San Diego: Academic Press, 1994.

Dora Matzke, Jonathon Love, Thomas V. Wiecki, Scott D. Brown, and et al. Release the BEESTS: Bayesian Estimation of Ex-Gaussian Stop Signal Reaction Times Distributions. *Frontiers in Psychology*, 4: Article 918, 2013.

Mohsen Soltanifar. Stop Signal Reaction Times: New Estimations with Longitudinal, Bayesian and Time Series based Methods, PhD Dissertation, Biostatistics Division, Dalla Lana School of Public Health, University of Toronto, Toronto, Canada, 2020.

Examples

```
mySSTdata1 <- simsstrack(
  pid=c("John.Smith", "Jane.McDonald", "Jane.McDonald"), block=c(1,1,2),
  n=c(50,100,150), m=c(10,20,30),
  SSD.b=c(200,220,240), dist.go=c("ExG", "ExG", "ExG"),
  theta.go=as.matrix.data.frame(rbind(c(400,60,30),c(440,90,90),c(440,90,90))),
  dist.stop=c("ExG", "ExG", "ExG"),
```

```
theta.stop=as.matrix.data.frame(rbind(c(100,70,60),c(120,80,70),c(120,80,70)))  
mySSTdata1
```

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