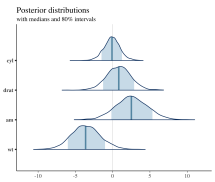
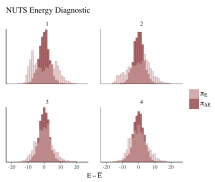
(https://mc-stan.org)

bayesplot

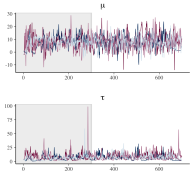
Plotting Bayesian models



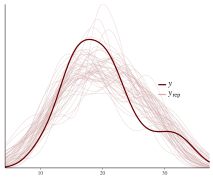
(https://mc-stan.org/assets/img/bayesplot/mcmc_areas-rstanarm.png)



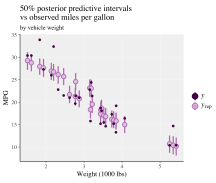
(https://mc-stan.org/assets/img/bayesplot/mcmc_nuts_energy-rstan.png)



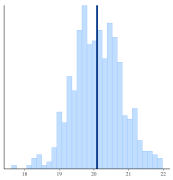
(https://mc-stan.org/assets/img/bayesplot/mcmc_trace-rstan.png)



(https://mc-stan.org/assets/img/bayesplot/ppc_dens_overlay-rstanarm.png)



(https://mc-stan.org/assets/img/bayesplot/ppc_intervals-rstanarm.png)



(https://mc-stan.org/assets/img/bayesplot/ppc_stat-rstanarm.png)

bayesplot is an R package providing an extensive library of plotting functions for use after fitting Bayesian models (typically with MCMC). The plots created by **bayesplot** are ggplot objects, which means that after a plot is created it can be further customized using various functions from the **ggplot2** package.

Currently **bayesplot** offers a variety of plots of posterior draws, visual MCMC diagnostics, and graphical posterior (or prior) predictive checking. Additional functionality (e.g. for forecasting/out-of-sample prediction and other inference-related tasks) will be added in future releases.

The idea behind **bayesplot** is not only to provide convenient functionality for users, but also a common set of functions that can be easily used by developers working on a variety of packages for Bayesian modeling, particularly (but not necessarily) those powered by **RStan** (https://mc-stan.org/rstan).

Getting Started

If you are just getting started with **bayesplot** we recommend starting with the tutorial vignettes (https://mc-stan.org/bayesplot/articles/index.html), the examples throughout the package documentation (https://mc-stan.org/bayesplot/reference/index.html), and the paper *Visualization in Bayesian workflow*:

- Gabry et al. (2019). Visualization in Bayesian workflow. *J. R. Stat. Soc. A*, 182: 389-402. doi:10.1111/rssa.12378 (doi:10.1111/rssa.12378). (journal version (https://rss.onlinelibrary.wiley.com/doi/full/10.1111/rssa.12378), arXiv preprint (https://arxiv.org/abs/1709.01449), code on GitHub (https://github.com/jgabry/bayes-vis-paper))

Installation

Install the latest release from **CRAN**:

```
install.packages (https://www.rdocumentation.org/packages/utils/topics/install.packages)("b
```

Install the latest development version from **GitHub**:

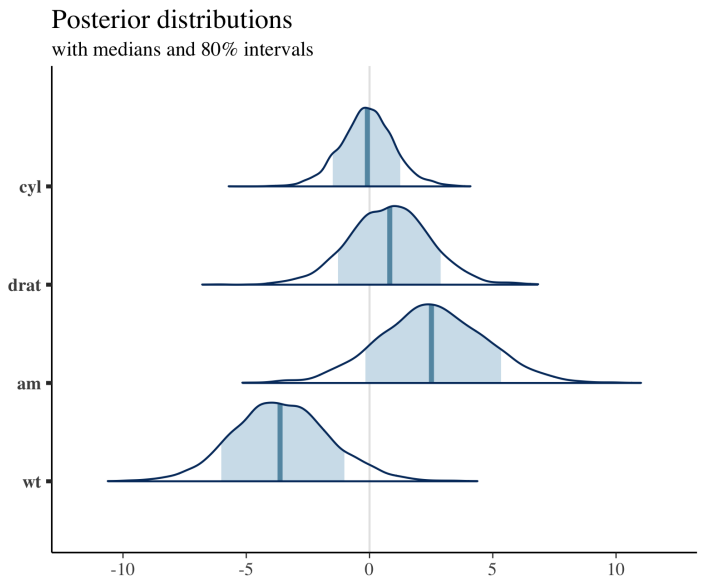
```
if (!require (https://www.rdocumentation.org/packages/base/topics/library)("devtools")) {
  install.packages (https://www.rdocumentation.org/packages/utils/topics/install.packages)(
}
devtools::install_github (https://www.rdocumentation.org/packages/devtools/topics/reexports
```

Installation from GitHub does not include the vignettes by default because they take some time to build, but the vignettes can always be accessed online anytime at mc-stan.org/bayesplot/articles (https://mc-stan.org/bayesplot/articles/)).

Examples

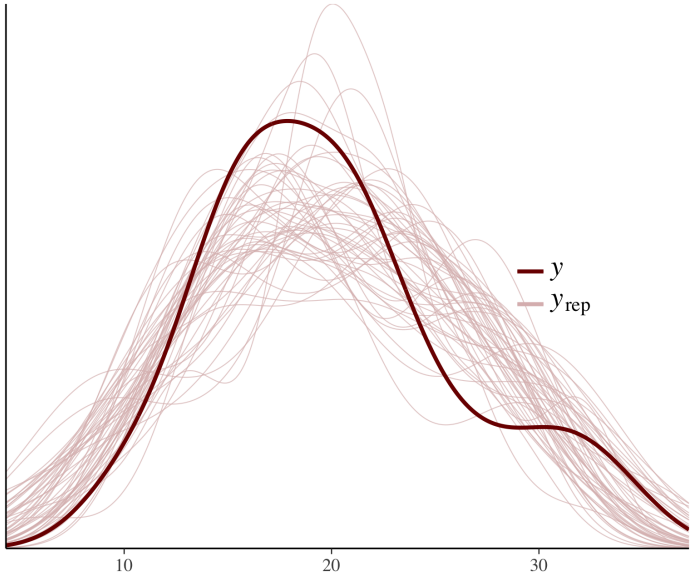
Some quick examples using MCMC draws obtained from our **rstanarm** (https://mc-stan.org/rstanarm) and **rstan** (https://mc-stan.org/rstan) packages.

```
library (https://www.rdocumentation.org/packages/base/topics/library)("bayesplot")
library (https://www.rdocumentation.org/packages/base/topics/library)("rstanarm")
library (https://www.rdocumentation.org/packages/base/topics/library)("ggplot2")

fit <- stan_glm (https://www.rdocumentation.org/packages/rstanarm/topics/stan_glm)(mpg ~ .,
posterior <- as.matrix (https://www.rdocumentation.org/packages/base/topics/matrix)(fit)

plot_title <- ggtitle (https://www.rdocumentation.org/packages/ggplot2/topics/labs)("Poster
                       "with medians and 80% intervals")
mcmc_areas (reference/MCMC-intervals.html)(posterior,
           pars = c (https://www.rdocumentation.org/packages/base/topics/c)("cyl", "drat",
           prob = 0.8) + plot_title
```



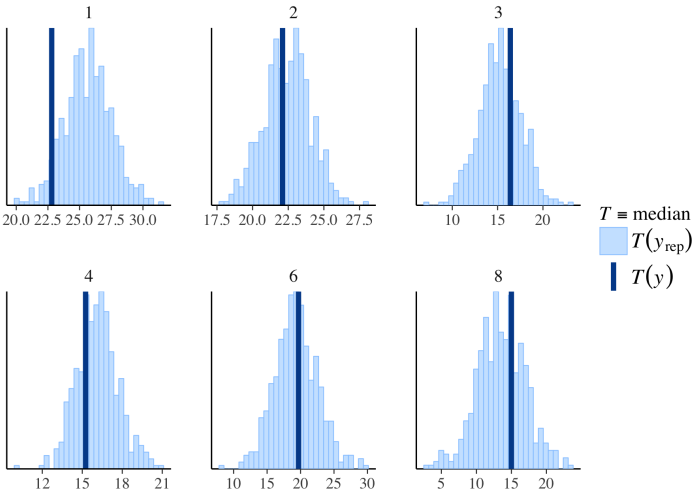
(https://raw.githubusercontent.com/stan-dev/bayesplot/master/images/mcmc_areas-rstanarm.png)

```
color_scheme_set (reference/bayesplot-colors.html)("red")
ppc_dens_overlay (reference/PPC-distributions.html)(y = fit$y,
                 yrep = posterior_predict (https://www.rdocumentation.org/packages/rstanarm
```



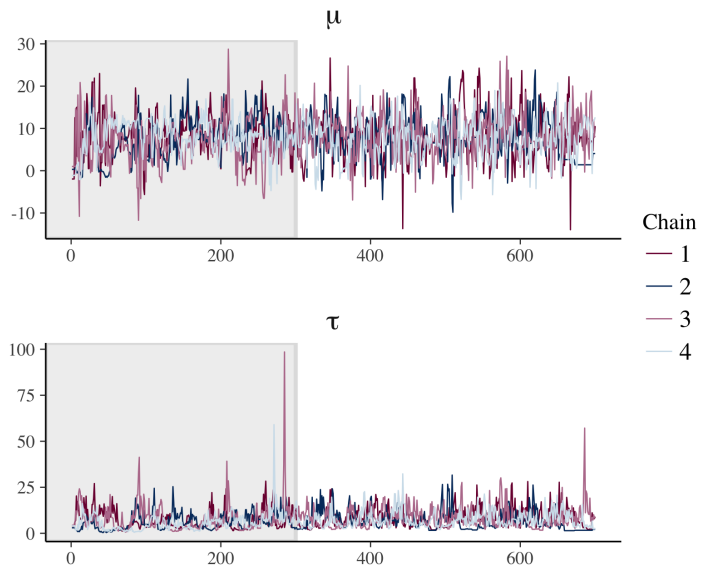
(https://raw.githubusercontent.com/stan-dev/bayesplot/master/images/ppc_dens_overlay-rstanarm.png)

```
# also works nicely with piping
library (https://www.rdocumentation.org/packages/base/topics/library)("dplyr")
color_scheme_set (reference/bayesplot-colors.html)("brightblue")
fit %>%
  posterior_predict (https://www.rdocumentation.org/packages/rstanarm/topics/posterior_pred
  ppc_stat_grouped (reference/PPC-test-statistics.html)(y = mtcars$mpg,
                   group = mtcars$carb,
                   stat = "median")
```



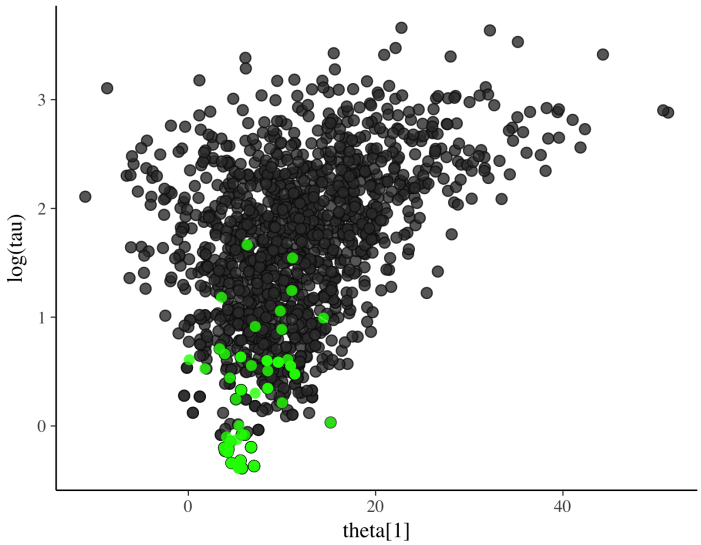
(https://raw.githubusercontent.com/stan-dev/bayesplot/master/images/ppc_stat_grouped-rstanarm.png)

```
# with rstan demo model
library (https://www.rdocumentation.org/packages/base/topics/library)("rstan")
fit2 <- stan_demo (https://www.rdocumentation.org/packages/rstan/topics/stan_demo)("eight_s
posterior2 <- extract (https://www.rdocumentation.org/packages/rstan/topics/stanfit-method-

color_scheme_set (reference/bayesplot-colors.html)("mix-blue-pink")
p <- mcmc_trace (reference/MCMC-traces.html)(posterior2,  pars = c (https://www.rdocumentat
                facet_args = list (https://www.rdocumentation.org/packages/base/topics/list
p + facet_text (reference/bayesplot-helpers.html)(size = 15)
```



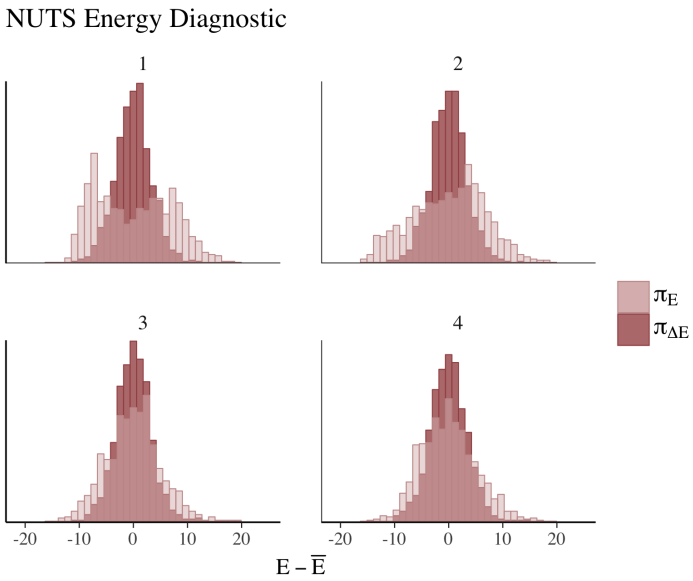
(https://raw.githubusercontent.com/stan-dev/bayesplot/master/images/mcmc_trace-rstan.png)

```
# scatter plot also showing divergences
color_scheme_set (reference/bayesplot-colors.html)("darkgray")
mcmc_scatter (reference/MCMC-scatterplots.html)(
  as.matrix (https://www.rdocumentation.org/packages/base/topics/matrix)(fit2),
  pars = c (https://www.rdocumentation.org/packages/base/topics/c)("tau", "theta[1]"),
  np = nuts_params (reference/bayesplot-extractors.html)(fit2),
  np_style = scatter_style_np (reference/MCMC-scatterplots.html)(div_color = "green", div_a
)
```



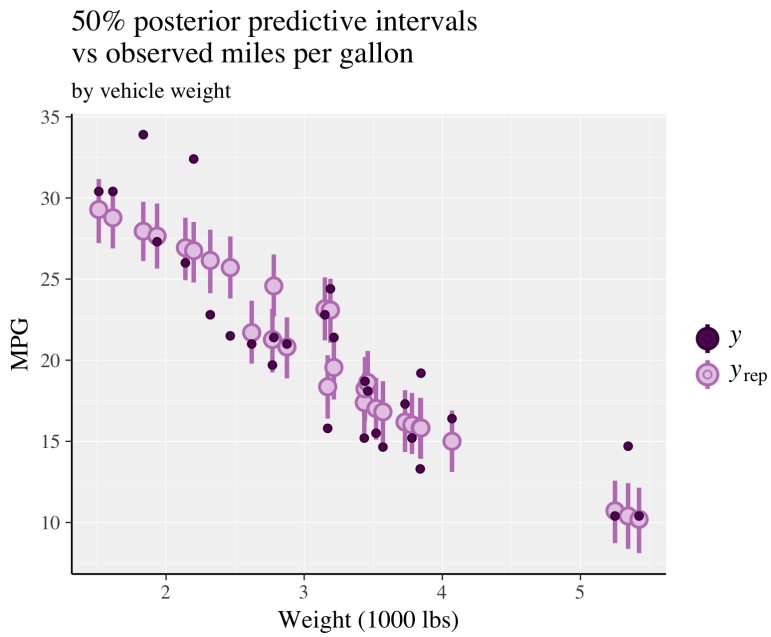
(https://raw.githubusercontent.com/stan-dev/bayesplot/master/images/mcmc_scatter-rstan.png)

```
color_scheme_set (reference/bayesplot-colors.html)("red")
np <- nuts_params (reference/bayesplot-extractors.html)(fit2)
mcmc_nuts_energy (reference/MCMC-nuts.html)(np) + ggtitle (https://www.rdocumentation.org/p
```



(https://raw.githubusercontent.com/stan-dev/bayesplot/master/images/mcmc_nuts_energy-rstan.png)

```
# another example with rstanarm
color_scheme_set (reference/bayesplot-colors.html)("purple")

fit <- stan_glmer (https://www.rdocumentation.org/packages/rstanarm/topics/stan_glmer)(mpg
ppc_intervals (reference/PPC-intervals.html)(
  y = mtcars$mpg,
  yrep = posterior_predict (https://www.rdocumentation.org/packages/rstanarm/topics/posteri
  x = mtcars$wt,
  prob = 0.5
) +
  labs (https://www.rdocumentation.org/packages/ggplot2/topics/labs)(
    x = "Weight (1000 lbs)",
    y = "MPG",
    title = "50% posterior predictive intervals \nvs observed miles per gallon",
    subtitle = "by vehicle weight"
  ) +
  panel_bg (reference/bayesplot-helpers.html)(fill = "gray95", color = NA) +
  grid_lines (reference/bayesplot-helpers.html)(color = "white")
```



(https://raw.githubusercontent.com/stan-dev/bayesplot/master/images/ppc_intervals-rstanarm.png)

Developed by Jonah Gabry, Tristan Mahr.

Site built with pkgdown (https://pkgdown.r-lib.org/) 1.3.0.