# Package: VARcheck (via r-universe)

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**Type** Package

**Title** Visual Diagnostic Checks for Vector Autoregressive Models

**Version** 0.1.0

**Description** Provides model-agnostic visual diagnostics for vector autoregressive (VAR) models. Given empirical data, model predictions, residuals, and optionally simulated data, the package assembles a multi-panel diagnostic grid: empirical vs. predicted time series, residual inspection, residuals vs. predictions scatter, and posterior predictive style checks via simulated trajectories. Output is a 'patchwork' object composed of 'ggplot2' plots, allowing further customisation via standard 'ggplot2' theme calls. Follows the approach described in Haslbeck et al. (2026) <doi:10.31234/osf.io/k6uz4_v3>.

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**Encoding** UTF-8

**URL** https://github.com/bsiepe/VARcheck, https://bsiepe.github.io/VARcheck/

**BugReports** https://github.com/bsiepe/VARcheck/issues

**Imports** ggplot2 (>= 3.4.0), patchwork, stats, utils

**Suggests** knitr, rmarkdown, testthat (>= 3.0.0)

**Config/testthat/edition** 3

**VignetteBuilder** knitr

**RoxygenNote** 7.3.3

**NeedsCompilation** no

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# Contents



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`new_var_data` *Create a VAR data object*

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## Description

Constructs a ‘var_data‘ object used as input to [plot_var_check()]. Each component is either a single ‘T x p‘ numeric matrix (single subject) or a list of ‘T_i x p‘ matrices (multiple subjects). Single matrices are coerced to a length-1 list automatically.

## Usage

```
new_var_data(
  empirical,
  predicted,
  residuals,
  simulated = NULL,
  var_names = NULL
)

## S3 method for class 'var_data'
print(x, ...)
```

## Arguments

| | |
|---|---|
| `empirical` | Numeric matrix or list of matrices. Observed values. |
| `predicted` | Numeric matrix or list of matrices. Model predictions. |
| `residuals` | Numeric matrix or list of matrices. Residuals (‘empirical - predicted‘). |
| `simulated` | Optional numeric matrix or list of matrices. Data simulated from the fitted model. Required only when plotting the ‘"simulated"‘ panel. |
| `var_names` | Optional character vector of length ‘p‘ with variable names used as plot labels. Defaults to ‘"V1"‘, ‘"V2"‘, etc. |
| `x` | A ‘var_data‘ object. |
| `...` | Not used; present for S3 method compatibility. |

## Value

An object of class ‘var_data‘.

## Examples

```
set.seed(1)
emp <- matrix(rnorm(200), nrow = 100, ncol = 2)
pred <- emp + matrix(rnorm(200, sd = 0.3), 100, 2)
res <- emp - pred
sim <- matrix(rnorm(200), 100, 2)
vd <- new_var_data(emp, pred, res, sim, var_names = c("Mood", "Energy"))
```

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# plot_var_check *Plot VAR model diagnostics*

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## Description

Creates a multi-panel diagnostic grid for a fitted VAR model. Each row corresponds to one variable; columns show (a) empirical data vs. predictions, (b) residuals over time, (c) residuals vs. predictions scatter, and (d) data simulated from the estimated model. Each time-series panel is accompanied by a marginal histogram with a Gaussian overlay.

## Usage

```
plot_var_check(
  data,
  subject = 1,
  vars = NULL,
  panels = c("data", "residuals", "scatter", "simulated"),
  colors = list(),
  theme = NULL,
  ylim_data = NULL,
  ylim_res = NULL
)
```

## Arguments

| | |
|---|---|
| data | A ‘var_data‘ object created with [new_var_data()]. |
| subject | Integer. Index of the subject to plot. Defaults to ‘1‘. |
| vars | Character or integer vector selecting variables to include. Defaults to all variables. |
| panels | Character vector controlling which columns are shown. Any subset of ‘c("data", "residuals", "scatter", "simulated")‘, in that order. Defaults to all four. |
| colors | Named list controlling line colours. Recognised elements: ‘empirical‘ (default ‘"black"‘) and ‘predicted‘ (default ‘"darkorange2"‘). Partial lists are merged with the defaults. |

| | |
|---|---|
| theme | A ‘ggplot2::theme()‘ object added on top of [theme_varcheck()]. Use this to override individual theme elements. |
| ylim_data | Numeric vector of length 2. Shared y-limits for the data-scale panels (empirical/predicted/simulated). Auto-computed from the data if ‘NULL‘. |
| ylim_res | Numeric vector of length 2. Shared y-limits for the residual panels. Auto-computed from the residuals if ‘NULL‘. |

## Value

A ‘patchwork‘ object.

## Examples

```
set.seed(1)
emp <- matrix(rnorm(300), nrow = 100, ncol = 3)
pred <- emp + matrix(rnorm(300, sd = 0.3), 100, 3)
res <- emp - pred
sim <- matrix(rnorm(300), 100, 3)
vd <- new_var_data(emp, pred, res, sim, var_names = c("X1", "X2", "X3"))

plot_var_check(vd)
```

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# theme_varcheck *Default VARcheck ggplot2 theme*

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## Description

A minimal theme used as the default style for all VARcheck plots. Pass a ‘ggplot2::theme()‘ object to the ‘theme‘ argument of [plot_var_check()] to override individual elements on top of this base.

## Usage

```
theme_varcheck()
```

## Value

A ‘ggplot2‘ theme object.

## Examples

```
theme_varcheck()
```

# Index