# Factored Structural Equation Modeling in Blimp

This repository contains supplemental material for *Factored Structural Equation Modeling in Blimp*.

The folder structure is as follows:

- **benchmark**: Blimp speed comparison
- **data**: Data sets for examples.
- **example**: `rblimp` example

## Blimp Installation Guide

Blimp is a standalone software package for Bayesian multilevel structural equation modeling and imputation. It runs as a command-line application across all major operating systems and may also be accessed through **Blimp Studio**, a graphical interface for interactive use, or **rbllimp**, an R interface for Blimp.

### 1. System Requirements

| PLATFORM | SUPPORTED VERSIONS | NOTES |
|---|---|---|
| **macOS** | macOS 11.6 (Big Sur) or later | Intel and Apple Silicon supported |
| **Windows** | Windows 10 or later | Requires admin privileges for installation |
| **Linux** | Ubuntu 20.04+ or RHEL 8+ | Static or dynamic binaries available |

> ***Tip:*** *For Linux users, if your system is older or managed (e.g., a cluster), prefer the* ***static*** *build to avoid library dependency issues.*

## 2. Downloading Blimp and Blimp Studio

Blimp binaries and installers are hosted on the official website:

**https://www.appliedmissingdata.com/blimp**

### Blimp Studio (Optional GUI for Mac or Windows)

**Blimp Studio** is a companion graphical interface to Blimp that provides:

- Model editing with syntax highlighting
- Automatic update notifications
- Project organization tools

Available downloads:

- **macOS installer** (`.dmg`)
- **Windows installer** (`.exe`)
- **Linux binaries:**
- `blimp_binary.tar.gz` – Ubuntu Static
- `blimp_binary_dynlibs.tar.gz` – Ubuntu Dynamic
- `blimp_binary-RHEL8.tar.gz` – RHEL 8 Static
- `blimp_binary_dynlibs-RHEL8.tar.gz` – RHEL 8 Dynamic

Offline installers that do not require internet connection are also available for macOS and Windows.

## 3. Installation Instructions

- Note: Blimp Installers version number differs from Blimp's computational engine version number.*

### macOS

1. Download the `.dmg` installer for macOS 11.6+ from the Blimp website.
2. Open the `.dmg` and double-click the installer, follow the installation prompts.
3. Once installed, Blimp and Blimp Studio will be available in

`/Applications/Blimp/` by default.

### Windows

1. Download the `.exe` installer for Windows 10+.
2. Right-click and choose **Run as Administrator**, and follow the installation prompts.
3. Once installed, Blimp and Blimp studio will be available in `C:\Program Files\Blimp` by default.

### Linux (Ubuntu/RHEL)

1. Download the appropriate archive for your distribution. Note Blimp Studio is not available for Linux.
2. Extract the tarball: `bash`
   ```
   tar -xzf blimp_binary.tar.gz
   ```
3. Move the executable to a directory in your `$PATH`:
4. Run Blimp directly from the terminal: `bash`
   ```
   blimp mymodel.imp
   ```

***Static vs. Dynamic Linux Builds***

| TYPE | DESCRIPTION | RECOMMENDED FOR |
|---|---|---|
| **Static** | Includes all dependencies; larger download size | Clusters, older distros, or restricted systems |
| **Dynamic** | Relies on system libraries; smaller file size | Modern desktop systems with up-to-date runtimes |

If you encounter runtime errors such as `missing libstdc++` or `glibc`, switch to the **static** version.

### Using Blimp on Clusters or Headless Systems

Blimp can be executed without a GUI, making it suitable for:

- High-Performance Computing (HPC) clusters
- Batch job submissions
- Command-line workflows

You can specify data, seeds, or output files directly: `bash`
`blimp myscript.imp --data=data.csv --output=results.txt`

For full argument details, see the *Running From Terminal* section of the *User Guide*.

## 5. Known Issues and Troubleshooting

- **Windows antivirus conflicts:**
  Some antivirus tools may block the installer or executable. Run the installer as Administrator or use the offline installer if network restrictions exist.
- **macOS security warnings:**
  If macOS prevents launching Blimp, go to *System Settings → Security & Privacy* and click *Allow Anyway*.

## 6. Installing `rblimp` (R Interface)

The **rblimp** package provides an R interface to the Blimp engine.

### Installation (current version)

```
install.packages("remotes")
remotes::install_github("blimp-stats/rblimp")
```

*Ensure that Blimp itself is installed and available in your system before loading `rblimp`.*

### Updating

- Update Blimp by launching the application (it auto-checks for new releases).
- Update `rblimp` in R: `r`
  `remotes::update_packages("rblimp")`
  Check your version with: `r`
  `packageVersion("rblimp")`

*Once `rblimp` is available on CRAN, these instructions will be updated accordingly.*

## 8. Support and Resources

- **Official site:** https://www.appliedmissingdata.com/blimp
- **Documentation:** Included in the *User Guide* available above
- **Support:** Contact information available on the website