





lavaangui: A graphical user interface for lavaan with integrated diagrammer

Julian D. Karch ¹

¹ Methodology and Statistics Department, Institute of Psychology, Leiden University, Leiden, the Netherlands 

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Summary

Structural equation modeling (SEM) is a popular statistical technique within the social and behavioral sciences. SEMs can be represented as graphs, so called path diagrams. Path diagrams facilitate the specification of SEMs because drawing them is often faster and less error-prone than specifying a model using equations or matrix algebra. lavaangui is a graphical user interface that allows specifying and fitting SEMs by drawing path diagrams. It is available as web application at <https://lavaangui.org>. Additionally, it can be installed as an R package and then supports creating interactive path diagrams from SEMs specified in the popular SEM package lavaan. A detailed tutorial of the graphical user interface is available at <https://doi.org/10.31234/osf.io/f4ary>.

Statement of need

Traditionally, SEMs had to be specified using a specific modeling syntax, which created an unnecessary entry barrier for applied researchers. To remedy this, most current versions of closed-source commercial software packages, such as AMOS (Arbuckle, 2019), Stata (StataCorp LLC, 2023), Mplus (Muthén & Muthén, 1998-2017), EQS (Bentler, 2006), and LISREL (Jöreskog & Sörbom, 22 C.E.), support model specification through the drawing of path diagrams. These graphical user interfaces are typically referred to as diagrammers. While there are many open-source packages available for SEM (Ernst & Peikert, 2024; Fox et al., 2022; Igolkina & Meshcheryakov, 2020; JASP Team, 2024; Neale et al., 2016; Oertzen et al., 2015; Rosseel, 2012; The jamovi project, 2024; van Lissa, 2024), only Ω nyx (Oertzen et al., 2015) includes a diagrammer. However, Ω nyx is standalone software and does not integrate well with other open-source statistical software, particularly R. A practical issue is that installing Ω nyx requires administrator privileges, which many researchers lack on their work computers. Additionally, Ω nyx uses its own routine to fit SEMs instead of one of the more popular open-source packages. lavaangui addresses these limitations: it can be installed as an R package, accessed without installation via <https://lavaangui.org> on any computer with a browser, and builds on lavaan, which is arguably the most widely used open-source SEM software.

Credits

lavaangui consists of a frontend and a backend. Most of the frontend is written in JavaScript, utilizing the Svelte framework. For drawing path diagrams, the Cytoscape.js (Franz et al., 2016) library is used, along with the extensions described in Dogrusoz et al. (2018). The CSS framework is Bootstrap, and Bootbox.js is employed for displaying prompts. Parts of

the frontend are written in R, using the Shiny (Chang et al., 2024) and DT (Xie et al., 2024) packages.

The backend is written in R, as a Shiny Server. The lavaan (Rosseel, 2012) package is used for model fitting. Some automatic layout algorithms are sourced from the semPlot (Epskamp, 2015) package, while the promises (Cheng, 2024) package enables asynchronous execution.

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