

# mimosa: A Modern Graphical User Interface for 2-level Mixed Models

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## Software

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## Summary

The mixed models special agent (*mimosa*) is a *shiny* (Chang, Cheng, Allaire, Xie, & McPherson, 2019) app for 2-level mixed models. Mixed models are rapidly becoming the gold standard of statistical analysis techniques in the behavioral sciences. Yet there is only a small number of user-friendly programs for conducting mixed model analyses. The most common tools often lack a graphical user interface, are proprietary, and involve a tedious process of getting data in and publication-ready tables out. An exception is the *shiny* app *mimosa* which offers an alternative that is free, open source, intuitive, and runs in a browser, making it easily accessible (see <https://www.mimosa.icu>).

The software is targeted at behavioral scientists who frequently use 2-level mixed models and want a solution that is tailored for this particular use case. For instance, researchers studying groups (e.g. students clustered in schools, individuals clustered in work groups) and researchers employing within-subjects designs almost exclusively analyze their data with 2-level mixed models. Unlike other software, *mimosa* was designed for this use case. It helps the analyst by automatically detecting potential grouping variables and categorizing these variables in level 1 and level 2. Furthermore, *mimosa* is researcher-oriented because it produces a single summary table via *sjPlot* (Lüdtke, 2018) that can be published in a scientific journal without any modifications.

To my knowledge, there are only a couple of free, open source, software packages for mixed models that have a graphical user interface. For a slightly outdated comparison of different mixed model software (including proprietary and command-line software) see West & Galecki (2012). *LMMgui* focuses on within-subjects-designs and as such can be seen as a direct competitor of *mimosa*. *LMMgui* offers diagnostic plots and can compare two models, which is missing in *mimosa*. The disadvantage of *LMMgui* is that it is only available for Windows, while *mimosa* runs on any platform because it is a browser application. Furthermore, *mimosa* has a cleaner interface, is easier to use, and produces a publication-ready output.

The *GAMLj* (Gallucci, 2020) module for *jamovi* (The jamovi project, 2019) is a more comprehensive tool for mixed model analysis. It is possible to model more than two levels and specify more complex models in general. *GAMLj*'s functionality is close to the command line interface of *lme4* (Bates, Mächler, Bolker, & Walker, 2015). This is a clear benefit, but it also comes with a downside: *GAMLj*'s interface is less clean than *mimosa*'s. *GAMLj* has many dialogues and the specification of a model is not as intuitive as in *mimosa*. Still, *GAMLj* is an almost perfect software for mixed models in general. On the other hand, *mimosa* follows the idea of doing one type of analysis well, which is the one that many behavioral researchers do most of the time: 2-level mixed models.

In contrast to the software packages I am aware of (including the ones discussed by West & Galecki (2012)), *mimosa* is the only one that runs in a browser. While this might be seen as a trivial advantage, it has clear benefits. There is no need to install or update *mimosa* or its

dependencies, and the application can be used at any place with an internet connection—for instance, at the office of a colleague who does not have jamovi and GAMLj installed, in the classroom, or at a conference presentation for a live analysis.

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