

Animal-based research: New experimental design for improved reproducibility

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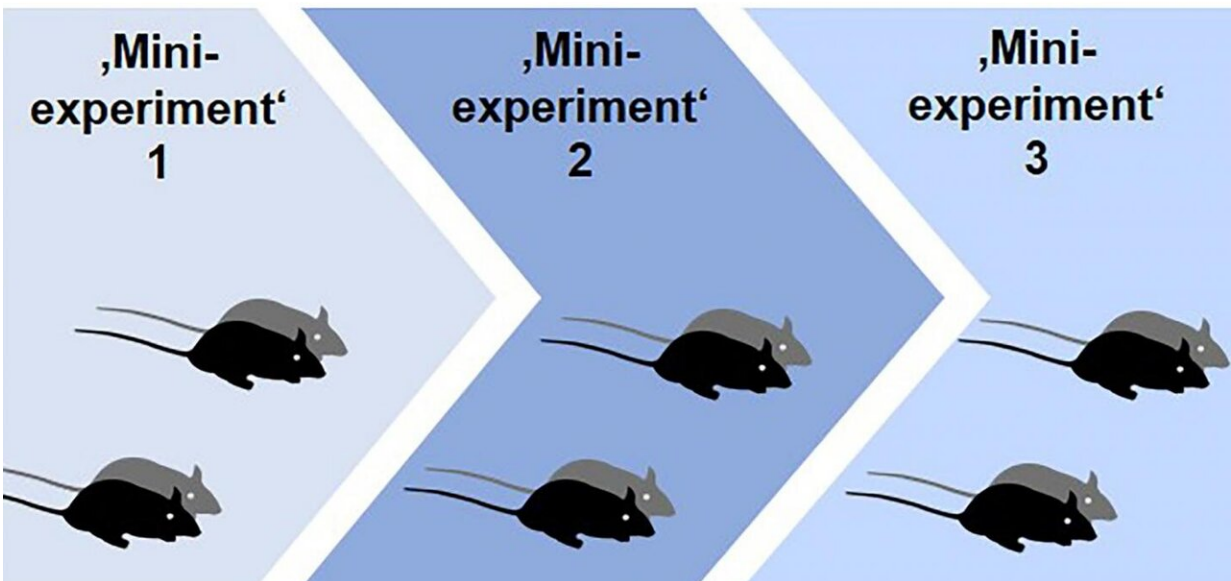
The behavioral biologists tested their newly developed experimental design on mice. Credit: WWU - Department of Behavioral Biology

In research, the results of studies must be precise and reproducible. For this reason, researchers carry out experiments under strictly standardized

laboratory conditions. However, despite the high standards applied, results from individual studies cannot always be reproduced in practice. Especially in cases in which animals are used for research purposes and the original study cannot be repeated, this raises severe ethical questions. For a long time now, researchers have been debating this aspect under the heading 'reproducibility crisis.' Behavioral scientists at the University of Münster have now been able to demonstrate that a new experimental design can improve the reproducibility and validity of results from studies involving animal experiments. The study has been published in the journal *Scientific Reports*.

What animal scientists usually understand by 'standardized experimental conditions' is that for example all the animals are tested on the same day in spring, at the same time and by the same person. Just taking a different season or time, however, can lead to different findings. Nowadays, there are debates more and more often as to whether the very strict standardization might not actually be the cause of numerous non-reproducible results. This is where the empirical study carried out by the Münster researchers comes in.

Instead of testing all the [animals](#) used in an experiment under strictly standardized conditions and at one point in time, the researchers split up the one big experiment into smaller, individual ones—so-called 'mini-experiments.' As a result, there were slight differences between 'mini-experiments' in laboratory-specific ambient conditions such as noise level or temperature. "It's important that the biological variation found in real life is reflected in the lab," explains Vanessa von Kortzfleisch, a Ph.D. student with Prof. Helene Richter at the Institute of Neuro- and Behavioral Biology at Münster University and first author of the study. "We were able to demonstrate," she adds, "that changing the design of the experiment slightly has enormous consequences for the knowledge gained."



The reproducibility and validity of studies involving animals is improved by carrying out smaller, independent 'mini-experiments'. Credit: WWU - Department of Behavioral Biology

The new experimental design was tried out on mice from different breeding lines, with several weeks between each 'mini-experiment.' In order to evaluate the reproducibility of the results in both experimental designs, the researchers repeated the same behavioral experiment four times in each design. "The results from the mini-experiment design turned out to be better reproducible than the results from the conventionally used standardized design," says Vanessa von Körtzfleisch.

Improving study designs is one important step towards better reproducible experiments in animal-based research. Although many [animal experiments](#) are still indispensable, there is agreement on limiting them to the minimum necessary, with guidance being provided by the '3R concept': replacement, reduction and refinement. The newly developed experimental design is not only easy to implement in research work, it also makes a significant contribution to the refinement and reduction of such experiments.

More information: Vanessa Tabea von Körtzfleisch et al, Improving reproducibility in animal research by splitting the study population into several 'mini-experiments', *Scientific Reports* (2020). [DOI: 10.1038/s41598-020-73503-4](#)

Provided by University of Münster

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