

## **Report of attendance at the “Train the trainer” Workshop on Teaching Experimental Design for Animal Experiments, held in Porto (P) Faculty of Medicine, September 12 -13, 2022**

As a manager of a facility for rodent behavioural studies, I have been often confronted with failed attempts to replicate published results. Reading carefully through the lines, one could realize that pseudoreplication, non-independence of variables, and other biases might have affected the reported results. Already several years ago I set up a class on methods in behavioural neuroscience for the PhD students. This included a 2 x 1.5-hours chapter introducing fundamental concepts of experimental design. With the intention of refurbishing this class and expanding on this topic, I attended the FELASA “Training the Trainer” Workshop on teaching experimental design for animal experiments, held in Porto on sept 12 -13 2022.

The goal of the workshop was to figure out a suitable format and harmonize contents of a short course on experimental design. Organizers were very experienced tutors, already acting since many years for the FRAME courses on Experimental Design. The 20 participants, persons involved in teaching experimental design at different levels, converged to share and discuss their experiences about relevant topics and effective teaching strategies.

In the first day, after some introductory talks focused on different types of design, issues in their choice, and statistical analysis, participants were divided in five groups and asked to evaluate, and in turn sketch out, different “scenarios”, i.e., situations where a clear experimental question is set, the related experimental tools and animals described, and the design, or aspects thereof, must be defined. The second day of the workshop was mostly devoted to discussions of the solutions found by participants to the “scenarios” proposed by the panel, as well as to scenarios proposed by the participants themselves.

A within-group survey aimed at compiling the content and structure of a two-day course on experimental design concluded the workshop.

As to the outcomes, opinions converged towards the following recommendations:

1. About the contents of the course:
  - a. Most salient learning outcomes should be the command of the following: experimental unit, blinding, randomisation and blocking, and the formalism of most common designs: completely randomised, factorial, randomised block, cross-over, split-plot, latin square
  - b. Include some fundamental concepts of hypothesis testing, and the relation linking sample size to p-value, Power, and effect size. Explain type I and type II errors.
  - c. Explain the concept behind ANOVA, with a focus on the impact of the number of factors on power.
  - d. List of possible biases in research resulting from inappropriate design, with examples.
2. About the format and the educational approach:
  - a. Try to have more than one presenter, to introduce debate and foster discussion

- b. Include group work. Discussion within groups will clarify misunderstandings and allows evaluation of the progression of knowledge. Examples of scenarios coming from the experience of the participants, to be discussed among group and with the panel, can be very useful.
- c. Unless teaching to people with very uniform background and scopes, try to use examples involving several species and different disciplines. This strengthens the conceptual value of experimental design.
- d. Consider using the PREPARE of the ARRIVE guidelines for practical exercises.
- e. Be clear and consistent with the terminology, and possibly provide a glossary.
- f. Consider the use of flipped teaching: provide some learning material day(s) before it will be discussed in the class. Similarly, some homework exercises can be included, to be discussed on the second day of teaching.
- g. If an assessment of learning is required, questions must arise from the material covered in the sessions.

I shall strive to integrate at least some of these outcomes into my forthcoming class on the design of behavioral experiments.

The workshop ended with some plans about how to establish a repository of teaching supports as well as a mailing list for trainers to share resources and other informations relevant to teaching the design of animal experiments.

I am grateful to the FELASA and ICLAS for supporting this initiative, and to the whole panel of experts, from Manuel Berdoy to Thomas Steckler, but in particular, I wish to thank Dr Derek J Fry, whose commitment in this teaching lasted also beyond the time of the workshop itself.

Fulvio Magara, PhD

Facility manager, behavioral scientist  
Centre d' etudes du Comportement  
Dept of Psychiatry, Lausanne University Hospital CHUV  
CH-1008 Prilly