

12.1.1.1: Things Worth Knowing About RM ANOVAs

Repeated Measures ANOVAs have some special properties that are worth knowing about. The main special property is that the error term used to for the F -value (the denominator of the calculated F ratio) will always be smaller than the error term (denominator) in a Between Groups ANOVA. It is smaller because we subtract out the error associated with the participant variability. This can have the consequence of generally making calculated F -values in Repeated Measures ANOVAs larger than calculated F -values in Between Groups ANOVAs because when the number in the bottom is smaller, it will make the resulting product a larger number.

Because big F values usually let us reject the idea that differences in our means are due to chance, the Repeated Measures ANOVA becomes a more sensitive test of the differences (its F -values are usually larger).

At the same time, there is a trade-off here. The Repeated Measures ANOVA uses different Degrees of Freedom, and these are typically smaller for the Within-Groups/Error in a Repeated Measures formula. The F -distributions for the Repeated Measures and Between Groups ANOVAs are actually different F -distributions, because they have different degrees of freedom.

If we generally get a bigger calculated score with Repeated Measures, but the bar is raised a little because the Degrees of Freedom are smaller, which type of research design should you try to use? Well, the answer is actually not statistical.

First, some IVs cannot be repeated. You can't teach someone to swim, and then put them in a condition in which they are expected to not know how to swim. In those cases, you must use a between groups design.

Second, with each additional condition (group), we have to get at least 30 more participants. This can get time-consuming and expensive quickly. Since repeated measures designs are more cost-effective, and they take into account each participants' individual tendencies, they are preferred.

The best of both worlds is to get the same amount of participants that we'd expect in a between groups design, but measure them repeatedly. This increases our sample size without actually increasing our number of participants!

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