

**A Crash Course in Experimental Design and Statistics for Biomedical Translators,  
by Lydia Stone**

<b>ENGLISH</b>	<b>Simplified definition</b>	<b>Russian</b>
alternative hypothesis	$H_A$ , an hypothesis contrary to the null hypothesis. A statement that the null hypothesis is false.	альтернативная гипотеза
*analysis of variance, ANOVA	A statistical test that can be used on between and within subject and multifactor designs to test significance of differences obtained.	дисперсионный анализ, метод Фишера
*baseline level	The initial measured level of some feature of the subjects before the experimental treatment	фон, исходный уровень
bell shaped curve	The shape of a Gaussian distribution. If scores are distributed normally the greater the difference between a score and the sample mean the lower the probability of obtaining it.	колоколообразная кривая
between group variance	The amount of variance among all scores in an experiment accounted for by effects of the experimental manipulation.	факторная дисперсия (дисперсия между группами)
between subject design	An experimental design in which each subject is tested under only one level of each independent variable.	Term required for completeness but I have never seen it in Russian.
blind study	A study in which either the experimenter or the subject or both are ignorant of which experimental conditions any subject is in.	исследование «вслепую»
Chi-square test	A non-parametric test testing whether two distributions are the same, or whether one distribution differs from the expected one.	критерий $\chi^2$
combined effects	Exposure of subjects to more than one manipulation at a time.	комплексные действия, комбинированные воздействия
confidence interval	The limits outside of which an event is not expected to occur by chance	доверительный интервал
*confounding	A situation in which an un-manipulated independent variable varies systematically with the manipulated variable so that the effect of the confounding and independent variable cannot be separated.	смешивание (факторов)
control group, treatment	Subjects (human or animal) not subjected to the treatment of interest but otherwise comparable to the experimental group and in all other respects treated the same. In within subject designs, the trials when subjects get no treatment or manipulation.	Контрольная группа Контрольное условие
*counterbalancing	Systematically varying the order of conditions or treatments between or within subjects so that sequence or time related effects are evenly distributed among all conditions.	уравновешивание
degrees of freedom	The number of values that are free to vary given that the sum of the values and the number of values are fixed. Usually = $n-1$ .	степени свободы
dependent variable	The variable the experimenter measures to assess the effect of the independent variable.	зависимая переменная
descriptive statistics	Methods for summarizing, organizing and communicating quantitative data.	описательная статистика
error bar	A line drawn through a point representing an observed value on a graph to indicate the confidence interval	зона заблуждения
*experimental condition	Any of the different conditions of an experiment; or just the one involving the manipulation of interest.	вариант опыта, комбинация условий

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experimental design (the process)	Structuring of an experiment to produce results most useful for statistical testing of the experimental hypothesis	планирование эксперимента
experimental design (the result of the process)	The result of the experimental design process. Specification by name or description of all relevant conditions of an experiment.	схема эксперимента
*experimental group, experimental treatment	Subjects that have undergone (or will under-go) the experimental treatment. Group applies to between subject designs and treatment to within subject designs.	основная группа, подопытная группа, экспериментальное условие
experimental treatment or manipulation	What the experimenter does to the subjects the effect of which s/he is trying to study.	экспериментальное воздействие; комбинация условий
F-ratio, F, F value	The actual value that is tested in analysis of variance	F-отношение, критерий Фишера
grand mean	The mean of all scores in an experiment	общее среднее
immediate effects	Effects seen immediately after exposure to some factor or treatment.	непосредственные последствия
interaction	Effect of one independent variable that depends on level of a second or other independent variables. For example, men may remember longer lists of sports equipment than of kitchen implements while the reverse is true for women.	взаимодействие
in the control (group, condition)	Pertaining to definition of <i>in the experimental (treatment, group, intervention, condition)</i>	в контроле, в контрольной группе
in the experimental (treatment, group, intervention, condition)	Pertaining to definition of <i>control group, treatment</i>	в эксперименте
independent variable	A variable systematically manipulated by the experimenter to determine the effect of one variable on another.	независимая переменная
*inferential statistics	The use of sample statistics to test hypotheses and make inferences about population parameters. Statistic inference involve two elements the inference and the measure of the goodness of the inference.	теория статистического вывода
intact, normal, untreated, control (animals)	Animals with no signs of abnormality, not subjected to any manipulation and compared to comparable animals that have undergone the experimental manipulation.	Интактные, контрольные животные
laboratory animals	Animals specifically raised to be subjects in experiments. Species of animals, e.g., rats, guinea pigs, used in experiments.	экспериментальные животные, лабораторные животные
late (remote) effects	Effects seen only some time after exposure to some factor or treatment.	отдаленные последствия
longitudinal method	The performance or use of a longitudinal study.	метод продольного анализа
longitudinal study	Studies in which the subjects are followed for a long period of time and tested at intervals.	длительное наблюдение
main effect	Simple effect of a single independent variable	главный эффект
matched, equivalent sample	In a between subjects design equating groups with regard to one or more variables in an attempt to reduce chance within group fluctuations.	эквивалентная выборка
mean (don't use average)	X (with horizontal line above it) a descriptive measure of central tendency, sum of all scores divided by number of scores.	среднее

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median	A descriptive measure of central tendency; the middle score or 50 <sup>th</sup> percentile.	медиана
mode, modal value	A descriptive measure of central tendency; the most common score.	наиболее вероятное значение
*multifactor experiment	An experiment in which more than one independent variable is used.	комплексный эксперимент
nested (hierarchical) design	A multilevel design in which all or subgroups of subjects at each level of one independent variable is exposed to multiple levels of a second independent variable.	гнездовой план; иерархический план
(non)parametric test	A test that makes assumptions about population probability distribution but not about specific parameters of the distribution. Parametric tests, tests based on values of specific estimated population parameters.	(не)параметрический критерий
normal (Gaussian) distribution	The distribution of sample parameters if a large number of samples are drawn from a population with a finite mean and standard deviation.	нормальное распределение (Гаусса)
*normal (human) subjects	In medical experiments, individuals who have not been diagnosed with disease and have no obvious signs thereof.	практически здоровые люди
null hypothesis	$H_0$ , a hypothesis stating that an experimental effect doesn't exist, that there's no difference between means of populations from which samples came. NB: a null hypothesis can only be rejected or not rejected, never proven.	нулевая гипотеза
one-tailed test	A procedure for testing the null hypothesis in which the entire rejection region is placed at one end of the sampling distribution. The alternative hypothesis specifies the direction of the difference between means.	односторонний критерий
patients	In medical experiments, individuals who have been diagnosed with a disease or condition.	больные
*population	The potential units for observation from which the sample to be observed is drawn.	генеральная совокупность
power of a test	The likelihood of correct rejection of the null hypothesis, i.e., the likelihood of not making a Type II error ( $1-\beta$ ).	мощность критерия
random sample	A sample selected through a procedure in which, ideally, each subject in the population has an equal chance of being selected.	случайная выборка
rejection of a null hypothesis	Concluding that, with an adequate likelihood, the null hypothesis is false.	отклонение нулевой гипотезы
rejection region (acceptance region)	A set of values of the test statistic that are contradictory to the null hypothesis and imply its rejection (the set of values that imply failure to reject the null hypothesis)	Область неприятия (приятия) гипотезы
reliability	The consistency with which the same operations yield the same measurement.	надежность
repeated measures, within subject design	A study in which each subject is tested under more than one level of the independent variable. Each subject is own control.	план повторного измерения
sample	Group of subjects selected from a population.	выборка
*short-term experiment	A study or experiment taking place over a short period of time.	острый опыт

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significance level	The predetermined level for rejecting the null hypothesis. Usually .05, .01, or .001, designated as $p$ . The probability that is used to define an experimental outcome as a rare even if only chance is operating.	уровень значимости
sign test	A non-parametric statistical test of whether two samples come from the same population.	критерий знаков
standard (z) score	Given scores that are distributed randomly in a population with mean $\mu$ and standard error of the mean $\sigma_{\mu}$ , the number of standard deviations a given score is above or below the distribution mean. A score of one standard error above the population mean is higher than 85% of the population and one 2 standard errors above the mean is above 99% of the population.	стандартная оценка; Z-метка
*standard deviation	$s$ , a descriptive measure of variability within a sample; the square root of the variance.	среднеквадратическое отклонение
*standard error of the mean	$\sigma$ , estimated standard deviation of means of a set of samples, obtained by dividing the standard deviation by number in each sample	среднеквадратическая ошибка среднего
statistical hypothesis testing	The use of statistics to test the likelihood of the null hypothesis that an experimental manipulation will have no effect.	проверка статистических гипотез
*statistical test	A set of operations on statistics generated by an experiment designed to assess the significance of a stated hypothesis.	критерий (статистический)
*statistically reliable or significant	Of a difference between two (+) statistics from two (+) different samples, of a magnitude such that the probability that the samples were drawn from the same population is less than some predetermined level.	значимый, достоверный
subject (animal)	Animal subject on which experimental manipulations are made.	биообъект, объект, подопытный
subject (human)	Person on whom experimental manipulations are made.	испытуемый, обследуемый
synchronous control	A group of animal subjects comparable to experimental subjects in an experiment that undergo all influences to which the experimental group is subjected at the same time, with the exception of the factors of interest, e.g., live in exactly the same cages, are transported to the experimental site etc.	синхронный контроль
*there's a trend (in the results)	The results are not statistically significant but we are going to talk about them as if they are.	проявляет тенденцию
treatment effect	The result of an experiment treatment or manipulation.	влияние фактора, эффект комбинации условий
*trial or test	A single "session" in an experiment in which a subject is exposed to a manipulation.	опыт; проба
*t-test	A test statistic used to test the difference between two means, especially if samples are small. It is not legitimate to use multiple t-tests to test the differences between means two by two in a multifactor or multilevel experiment. Student is the test developer.	t-критерий (метод), критерий Стьюдента, Стьюдентизация
two-tailed test	A procedure for testing the null hypothesis in which the rejection region is evenly divided between the two ends of the distribution. The alternative hypothesis is that the two means differ.	двусторонний критерий
Type I (II) error	I = Rejection of the null hypothesis when it is true ( $\alpha$ ). (II=Failure to reject the null hypothesis if it is false $/\beta$ ).	ошибка первого (второго) рода

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*using ANOVA; using a t-test	From the names of the test developers Fisher and Student.	по Фишеру; по Стьюденту
validity	Whether the operations performed measure what they are purported to measure.	валидность
variance	Represented by $s^2$ . a descriptive measure of variability within a sample; the sum of squared deviations of each score from the mean divided by the number of scores minus one.	дисперсия
vivarium control	A group of animal subjects comparable to experimental subjects in a field (e.g., space) experiment that remain in the place where they were raised and, subsequent to the experiment, are compared to the experimental group.	виварийный контроль
within group variance	The amount of variance among all scores in an experiment accounted for by random individual-to-individual variation.	случайная дисперсия (дисперсия внутри групп)

Sources for chart: All languages: Rasch, D. Biometriches Worterbuch (9 languages), VEB Deutscher Landwirtschaftsverlag, 1987; Russian: Lydia Stone; Kovalenko, E.G. English Russian Terminological Dictionary on Experimental Design, Zhivoy Yazyk, 1995. Definitions, Assorted statistics books. Errors: Lydia Stone