**Seminar 3: Interpretation, analysis and evidence**

**Repeatability:** there is sufficient information for a qualified researcher, other than the original experimenter, to be able to set up and run the experiment again

**Reproducibility:** when a competent repetition of the original experiment yields the same results

**Replicability:** when a new experiment that investigates the same (or a closely related) hypothesis but uses different methods and data, yields the same (or a similar and highly corroborative) result.

**Statistical evaluation (p-value, significance level, control group):**

**P-value:** (or probability value) is, for a given statistical model, the probability that, when the null hypothesis is true, the statistical summary (such as the sample mean difference between two groups) would be equal to, or more extreme then, the actual observed results.

**Significance level:** the probability of the study rejecting the null hypothesis, given that the null hypothesis were assumed to be true.

**Control group:** a group to compare results with (compared to the test group)

**Causal explanation:** to explain the outcome or regularity, we undertake to discover the causes/ conditions/ circumstances that combine to bring the outcome about

**Deductive-Nomological account of explanation:** answers the question: “Why did the explanandum-phenomenon occur?” by showing that the phenomenon resulted from certain particular circumstances, specified in C1,…, Ck in accordance with the laws L1,…, Lr.

By pointing this out, the argument shows that, given the particular circumstances and the laws in question, the occurrence of the phenomenon was to be expected; and it is in this sense that the explanation enables us to understand why the phenomenon occurred.

**Correlation:** measures the association between two variables

**Causality:** (or causation) measures the productive influence of one variable on another, one process of state, a cause, contributes to the production of another process or state, an effect, where the cause is partly responsible for the effect, and the effect is partly dependent on the cause.

**Hypothetico-Deductive method for hypothesis testing:**

1. (hypothetico) part in which a hypothesis or theory, arising from whatever source, is proposed for test.
2. (deductive) part in which test consequences are drawn from the hypothesis.
3. Consequences are deduced and compared with experiment of what we can observe. The consequences pass or fail when the comparison is made.

**Neyman-Pearson hypothesis:** correct decision, type1 and type2 error.

**Duhem-Quine thesis:** impossible to test a theory, equation or hypothesis in isolation, because an empirical test of the hypothesis requires one or more background assumptions (also called auxiliary assumptions or auxiliary hypothesis). (cannot reject the hypothesis just in the conjunction with the auxiliary assumption, when true increase the confidence in the hypothesis)

**Ad hoc-hypothesis:** a hypothesis added to a theory in order to save it from being falsified. It doesn’t improve the falsifiability.

**Falsificationism (Popper):** a scientific philosophy based on the requirement that hypothesis must be falsifiable in order to be scientific; if a claim is not able to be refuted it is not a scientific claim. Theories cannot be proved but only shown to be false.