Week 6

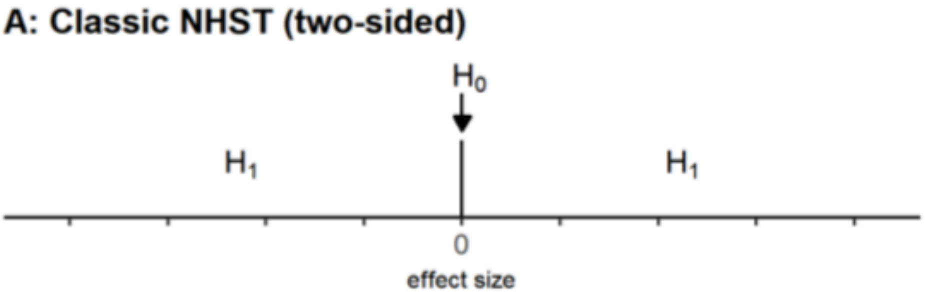
Monday, 28 January 2019 12:29

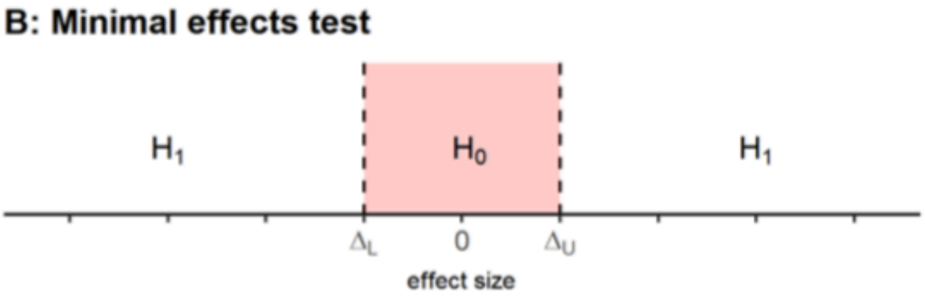
Philosophy of Science

- Degenerative research line: ad-hoc assumption are made base on results
- Progressive research line: a new fact is predicted from the data
- After a scientific revolution we can't even interpret data that was captured before, so we completely change viewpoint and hence no theory is valid forever
- Science is not cumulative but revolutionary according to Kuhn
- Null hypothesis test often criticized as a reference, and always false if sample size big enough as very small effect will be observed due to systematic noise (crud factor)
- "All models are wrong, some models are useful"
- Strong inference: crucial experiments that exclude one alternative hypothesis
- So a good approach to Science is to try and disprove your theory
- Null is not a bold prediction and neither a point prediction

Equivalence testing

- NHST = Null Hypothesis Equivalence Testing





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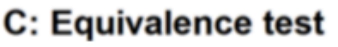

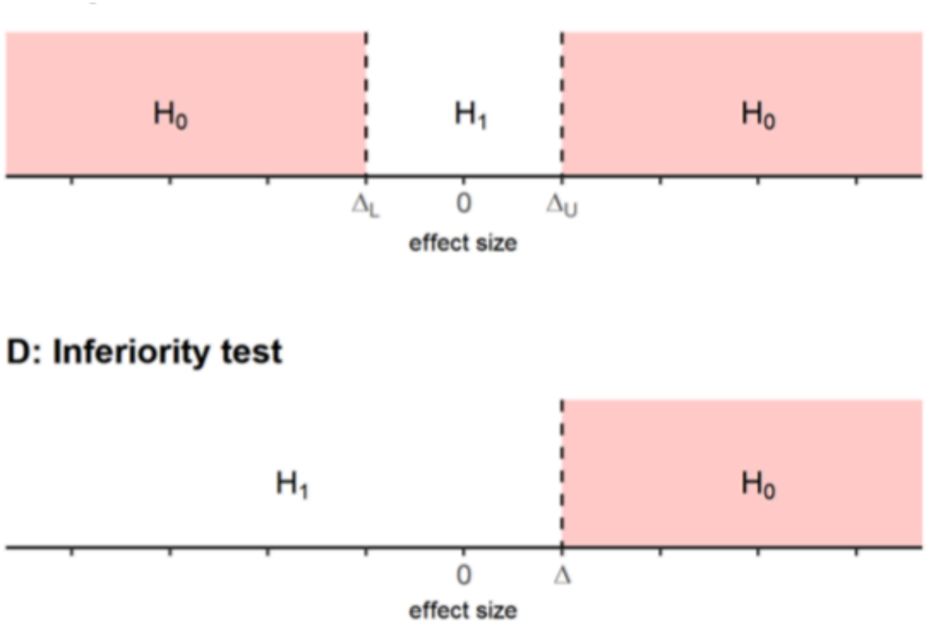

D: Inferiority test

- NHST only reject effect of exactly 0, whereas equivalence look at the effect size expected
- Equivalence test: the null hypothesis is that there is an effect greater than the smallest effect size of interest (SESOI)

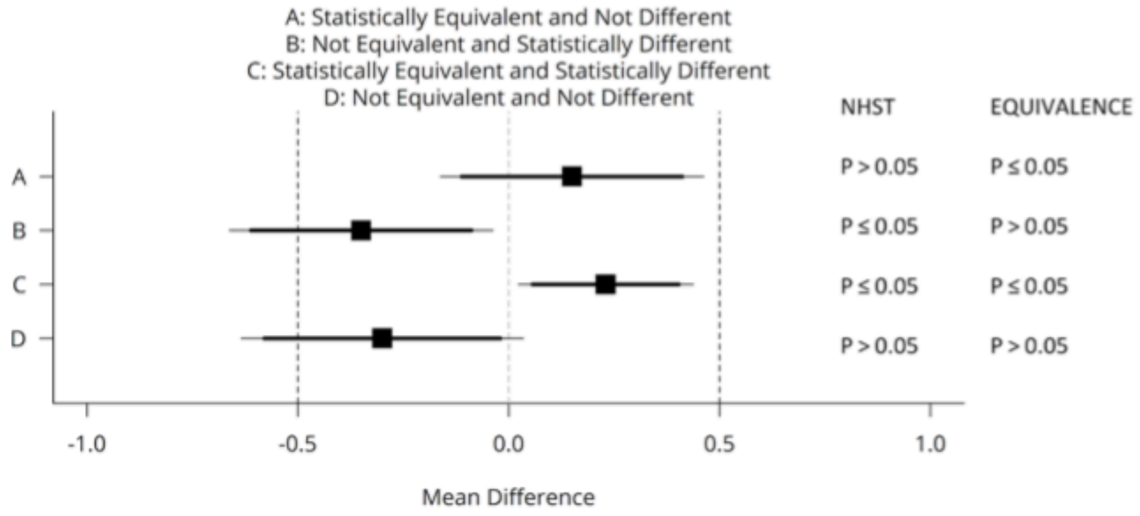

Figure 2. Four possible outcomes when combining NHST and equivalence tests.

- A: effect does not differ from 0 and is too small to be of interest
- B: effect differs from 0 and big enough to be of interest
- C: effect differs from 0 but is too small to be of interest
- D: effect does not differ from 0 and big enough to be of interest --> need more data

Theory construction

- Thought experiments can be powerful
- Fielder (2004): the scientific cycle is both loosening and tightening