Meta-analysis

Problem with vote counting approach, you can only check the studies that have been published (for example for the fear effect). The ones that don't get published usually don't have significant results. This could be because the sample size is too small.

So, there's a need for another method.

If you combine different studies, with example; all have a positive correlation. But if you would combine them, this would result in a negative correlation.

frequency

aquatic   terrestial
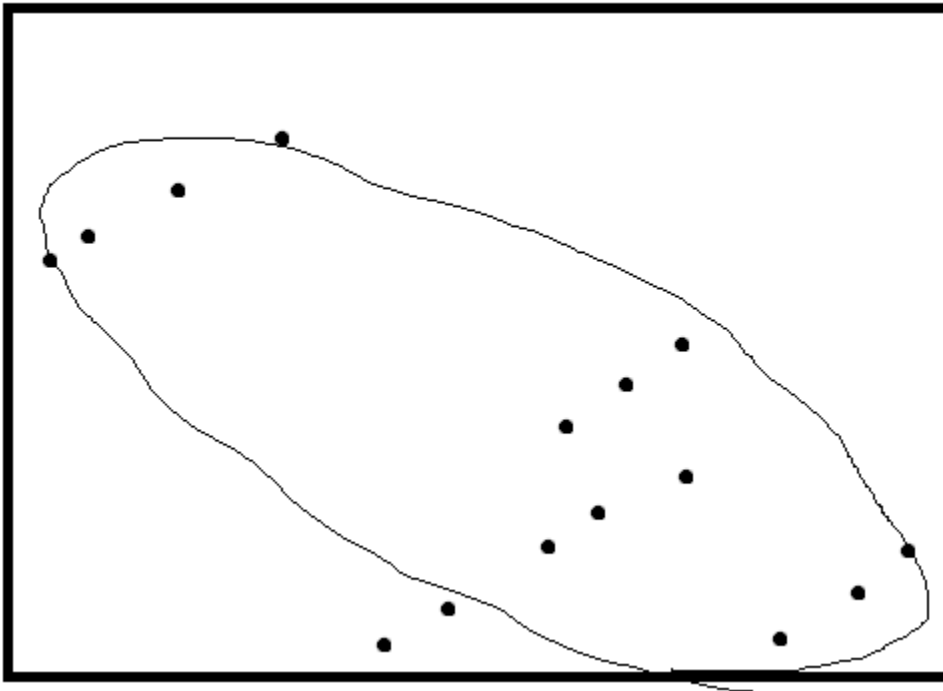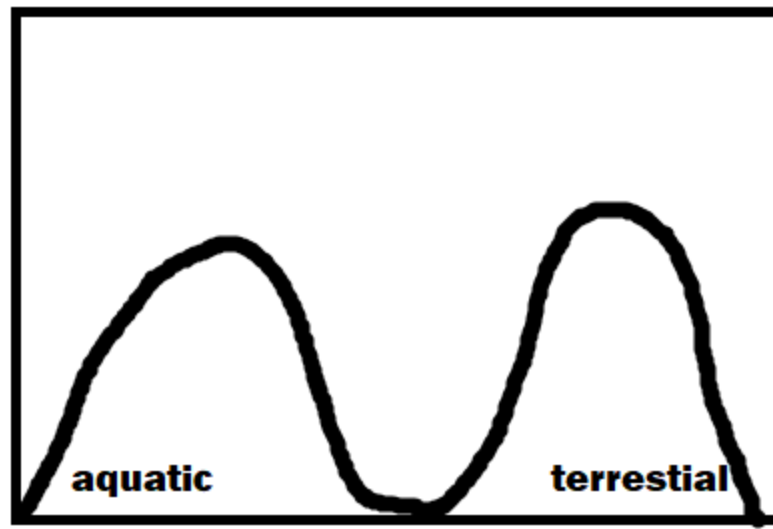
effect size

If you have a very low sample size, it will not show an accurate effect size. But if you'll have a lot of studies, these would cancel out. If you plot them all, it is called a *funnel.* However, the studies that won't get published are the ones with a small effect size and a small sample size, so there would be a hole in the funnel. Which would result in r < 0.

sample size

r < 0

effect size

Failsafe number

{ES1, ES2,… ES10 }=> ES = 2.1 [1.1, 3.1] (95% C.I.)

Let's say another study (ES11) would have an effect size of 0, which would change the interval

If you need to add a few studies to nullify the mean effect size, this is bad. It's better if you need to add a lot of studies to nullify the mean effect size, you don't have a file drawer problem.

Rule of thumb would be: 5K + 10 = 60 (K = number of studies published). 60 would be the threshold with 10 studies published

What is the strength of a study: Cohen's d = the difference of the means of two treatments divided by the standard deviation. This results in a unitless number.

Response ratio: mean of the treatment divided by the control; which would also result in unitless number.

Most often people use a full one and a truncated one

Don't learn formula of standard deviation!

We want to get the mean effect size. It's not a good way to just sum all the ES together.

⇨ We need to add weight to the studies with a small standard error (which is related to a large sample size).

You can calculate the weighted effect sizes by dividing the ES by squared standard errors ($w_1 = 1/SE^2$) => ES(weighted) = $w_1 \cdot ES_1$

Average ES standard error interval: ES +- 1.96 s.e.

0 can't be included in this interval

Heterogeneity (Q) can be calculated within groups, between groups and a total ($Q_t = Q_W + Q_B$)

How to express in general the heterogeneity within a group: the squared sum of (all the individual deviations minus the observed mean ES)

Q(between) = …

Degrees of freedom is the number of studies minus 1 (n-1)

If significant (p<0.05):

Qbetween is used to check if we need to have multiple groups or not

…

There is no 0 in the CI of TMI or DMI, so there is a direct killing and risk effects present overall

In the two level food chain there is no difference between TMI and DMI because the means are in the othere CI's. In the three level food chain there is a difference, also, the fear effect of TMI is much bigger than the DMI.

0..58 is not in the CI of the 3level food chain, and 0.85 iis not in the CI of the two level food chain. This means the fear effect has a bigger effect on the resources than on the prey.

Meta-analysis of NCE pathways

We know from Lotka Volterra that r = [b(E/t * tf) – x] – m – e + i

Which component is more important? From each study they extracted the ratio of the mean of the treatment divided by the mean of the control. If there's nothing happening: i.e. no effect, this would result in 1. (i.e. the two means are the same (control and treatment)). 0 means it has a strong effect.

Overall, if 1 is included in the CI of the mean effect size, it means this effect is not strong and won't explain it. However in this example this is never the case, thus they all have an effect.

(2004) Nelson EH