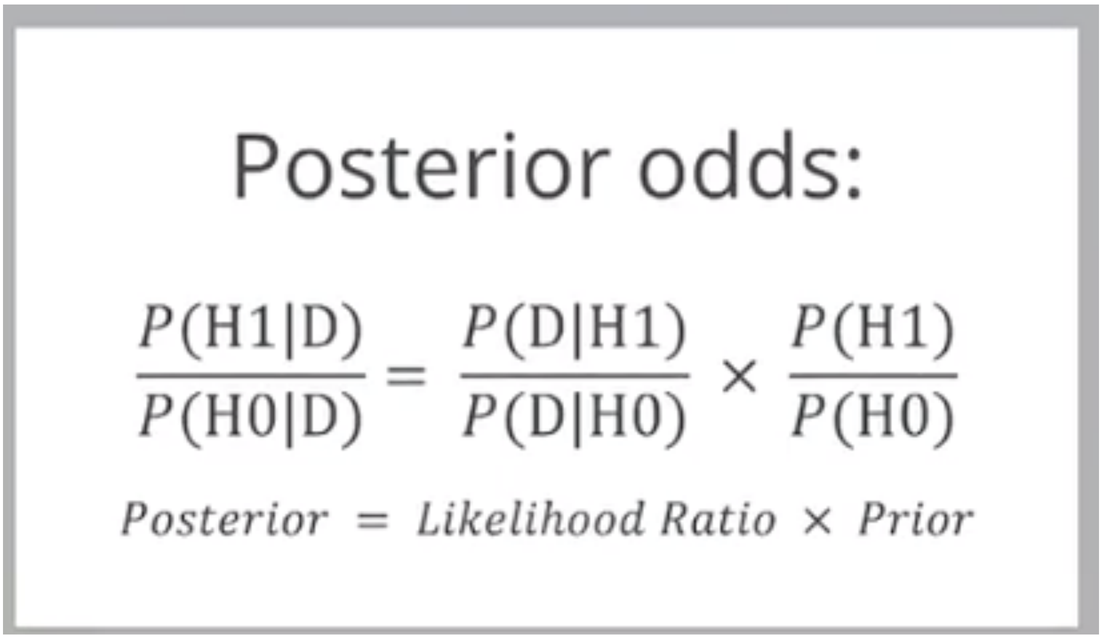
Week 2

Tuesday, 8 January 2019 08:56

- **Likelihoods**
  - Observe phenomenon then compute likelihood of observation given hypothesis
  - Ratios
    - H0/H1 or H1/H0
    - Ratio > 8 moderately strong evidence
    - Ratio > 32 strong evidence
    - H0 and H1 can be not useful hence care need to be taken with ratios
  - We can also use H0 with teta=0.05 and h1 with teta=0.8(power) to compare the likelihood of both. E.g. 2 out 3 study are significant gives ratio of 54
  - Mixed results is very likely for example with 3 studies, even with H1 true likeliness to not find 3 significant result is 49%!

- **Bayesian**
  - Use prior belief to infer likeliness of result
  - P-value was P(data|H0), but what you want to know is P(H0|data) and P(H1 |data), for this we update odds from prior to posterior



  - We need to start with initial distribution, called beta distribution of parameters α and β, for example [50,50] gives a normal around 0.5 i.e. fair coin and [1,1] is uniform distribution

The posterior is a Beta(α*, β*) distribution:

$\alpha^* = \alpha_{prior} + \alpha_{likelihood} - 1$

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- Bayes factor is relative evidence and enable us to only quantify the relative prob hypothesis being true compared to another hypothesis
- If prior == uniform ==> posterior == likelihood
- Bayesian estimation: only use posterior to estimate plausible values instead of u models
- After prior and data we have a new model and can iterate as many times as wan refine the estimation of the phenomenon observed.
- The Bayes factor represents how much we have updated our beliefs, based on obs data.

- **Practice**
  - B C B A A 0.9999131 undetermined answer
  - Bayes: compare different posterior given different priors and same Θ, Likelihood different Θ values
  - ??? For Bayes does the posterior and prior not depends on size of study i.e. N?
  - Rule of thumb is Bayes factor 1-3 v. small, 3-10 substantial, >10 strong, only des difference in belief. So if starting really small even BF14 will not change our belie
  - Credible interval is equivalent to confidence interval for uniform prior only

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