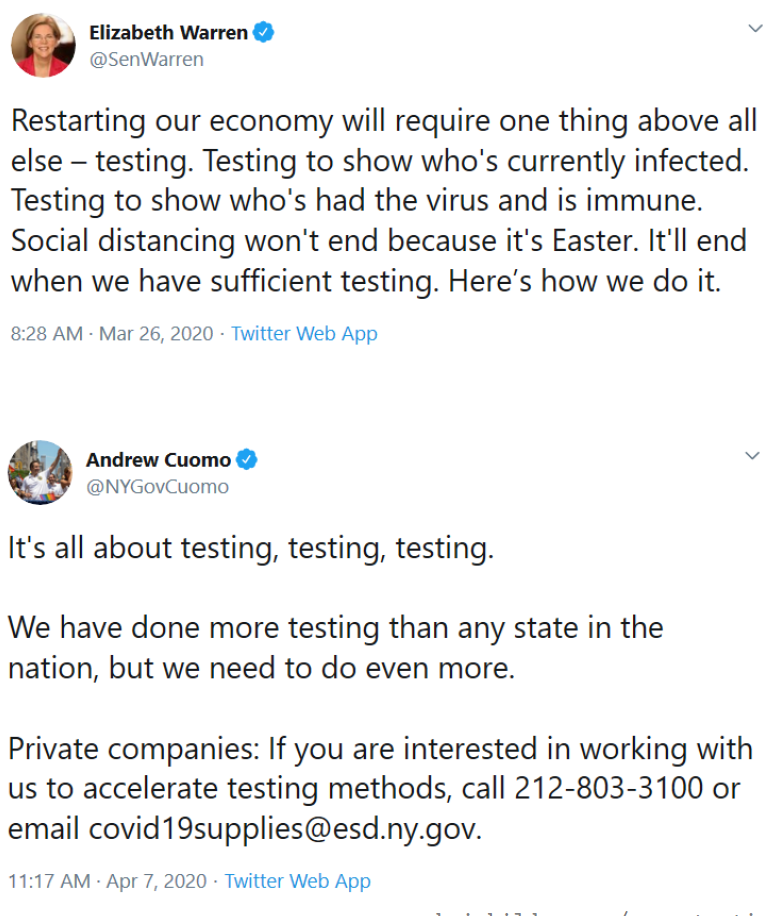
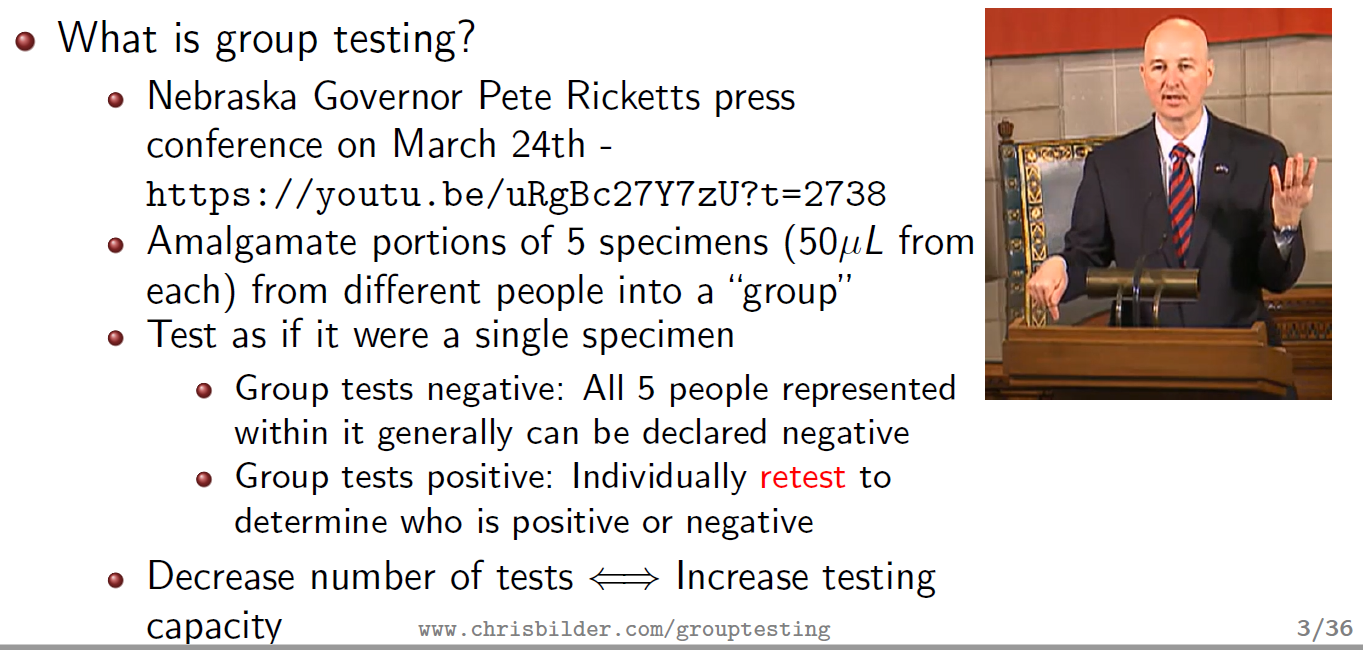
**Week 3 class – Group testing**

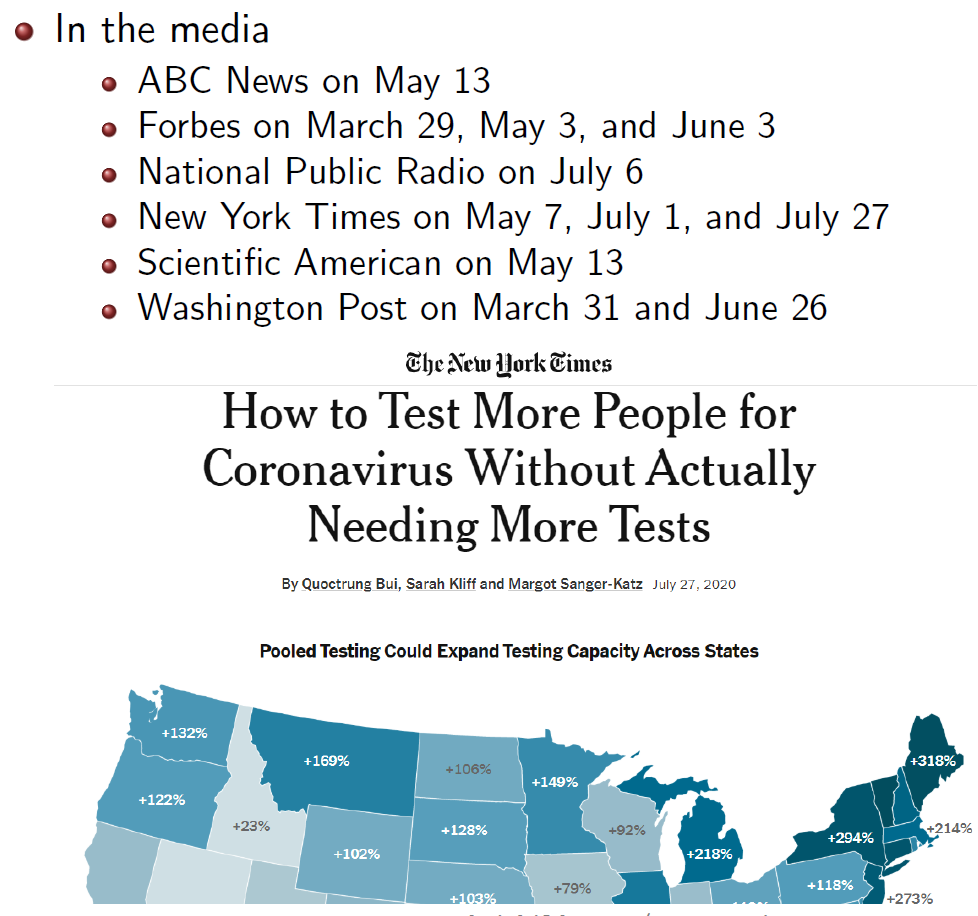
* Testing for SARS-CoV-2, the virus that leads to COVID-19
  + Importance



* + Cannot do as many tests as would like or needed to eliminate the virus
  + Group testing (a.k.a., pooled testing)



* + - Simplest implementation
    - Abdalhamid et al. (*American Journal of Clinical Pathology*, 2020)
  + News articles – poll



* + Define T as a discrete random variable for the number of tests for a group of size 5
    - t = 1 if the group tests negative
    - t = 6 if the group tests positive
  + Define p as the disease prevalence in the population
    - Group of size 5
    - P(T = 1) = (1 – p)5
    - P(T = 6) = 1 – (1 – p)5
  + Expected number of tests



* + If p = 0.05, then E(T) = 2.13

> p <- 0.05

> I <- 5 # group size

> 1\*(1-p)^I + 6\*(1 - (1-p)^I)

[1] 2.131095

> 2.13/5 # Expected number of tests per person

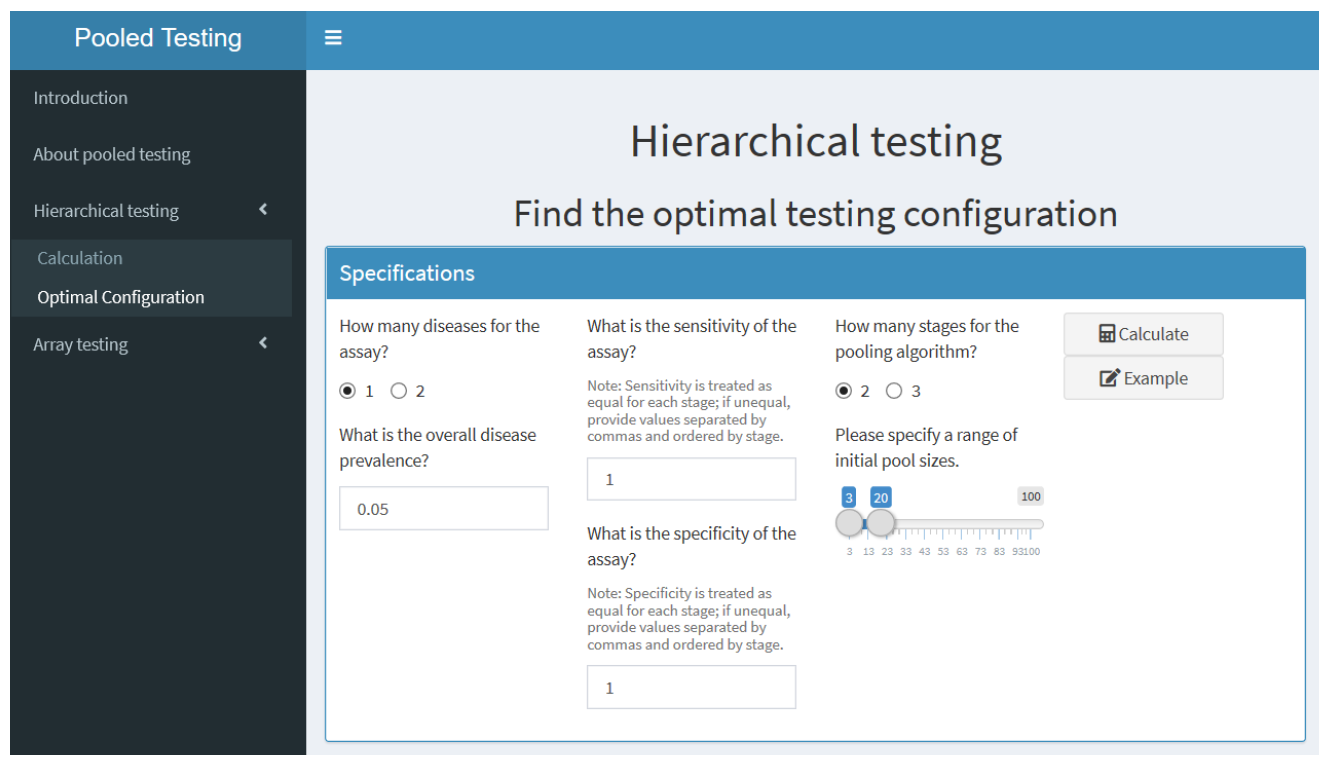
[1] 0.426  
> 1-0.426 # Expected reduction in the number of tests

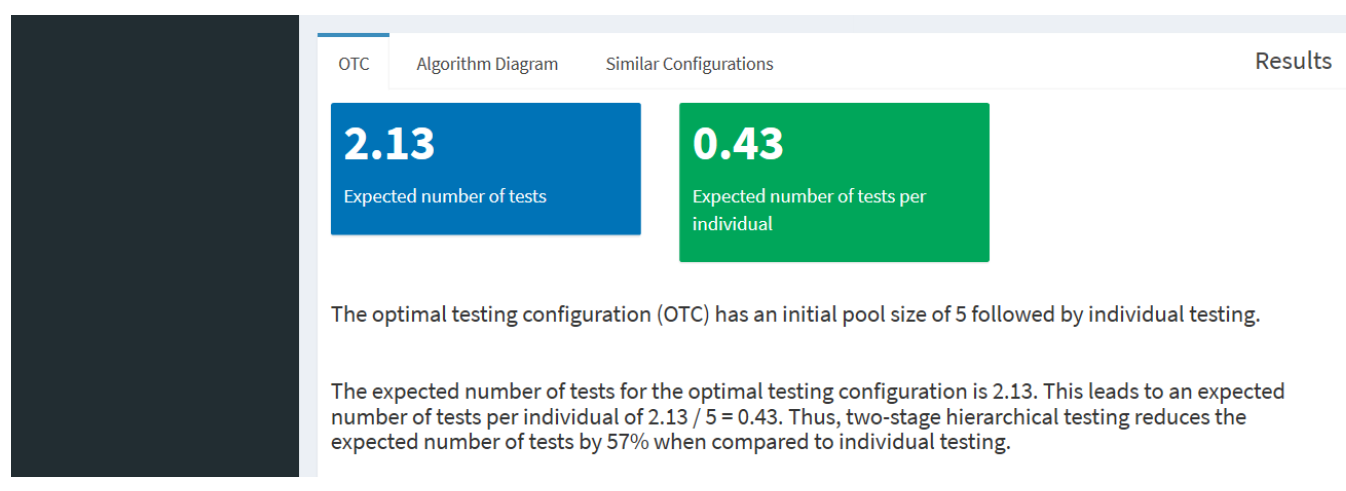
[1] 0.574

> 1/0.426-1 # Expected increase in testing capacity

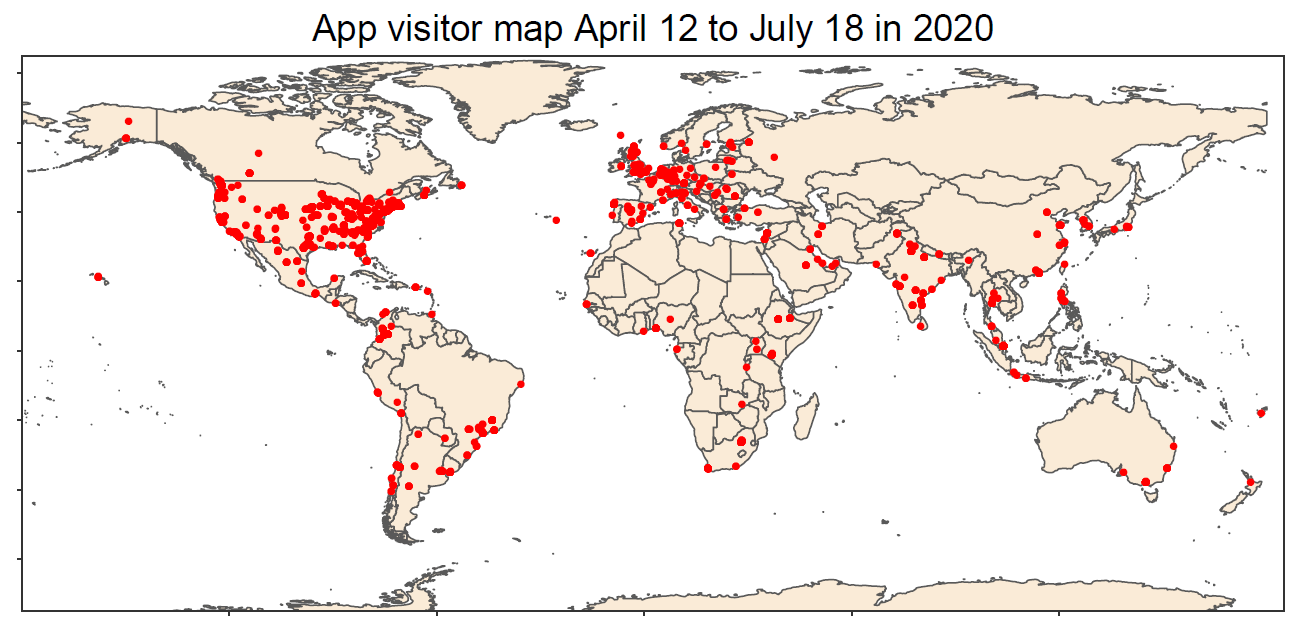
[1] 1.347418

* + Goal is to use a group size that minimizes the E(T)
    - No closed form expression
    - OTC1() function in the binGroup2 package of R
    - Shiny app – [www.chrisbilder.com/shiny](http://www.chrisbilder.com/shiny)





* + Worldwide use – 76 counties, 44 US states



* + Seminars

