

1.

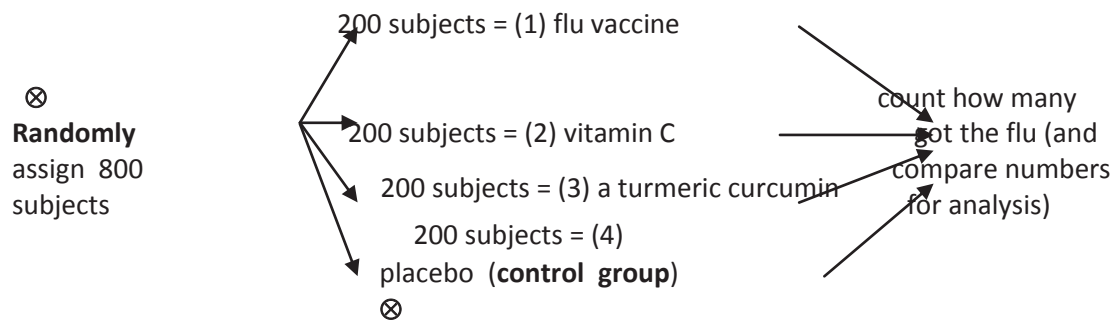
a. **Subjects (patients) have a psychological reaction to any treatment. There might be a psychosomatic effect (called the placebo effect) from expecting relief from a treatment. Without the placebo, only the treatment groups (1) and (2) will experience the placebo effect. The placebo effect is then confounded with the effect of the flu vaccine or vitamin C.** ⊗

b. There are **several possible response variables.** (One that makes sense is enough.) ⊗

- "flu" or "no flu" within a specific time period
- the # of patients who got the flu within a specific time period
- the proportion of flu occurrence

etc.

c. **Experiment Design Diagram** ⊗



(Randomizing the order of treatment applications is not sensible in this study.)

2.

A. the products. 16 are required.

B. the treatments are given by the combination of temperate and the stirring rate. There are 8 different treatments in total.

C. There is no control group for this study

D. The yield of product

E. Stage 1: randomly assign the product to the treatments

State 2: randomly order the actual order of production.

3.

A. $I=4, J=7, X_{1.} = 3.7453*7=26.2171, X_{2.} = 4.7953*7, X_{3.} = 5.5472*7, X_{4.} = 4.8658*7$

the grand total $X_{..} = X_{1.} + X_{2.} + X_{3.} + X_{4.} = 132.6752$

$CF = 132.6752^2 / 28 = 628.6682$

$SST = 683.3276 - 628.6682 = 54.6594$

$SSTr = (687.3363 + 1126.7502 + 1507.8000 + 1160.1245) / 7 - 628.6682 = 11.61909$

$SSE = 54.6594 - 11.61909 = 43.0403$

B. 1) $H_0: u_1 = u_2 = u_3 = u_4$ vs $H_a: H_0$ is false

2) $F = MSTr / MSE = 11.61909 / 3 / (43.0403 / 4 * 6) = 2.159$

3) $p\text{-value} = 1 - pf(2.159, 3, 24) = 0.119$

4) Since $p\text{-value}$ is greater than $\alpha = 0.05$, we retain the null hypothesis. There is no strong evidence to conclude that the average fly distance is different among the four treatments.