

Recap

- ANOVA in the context of model comparison/selection
- least squares fit ; consistency that allowed us to select models

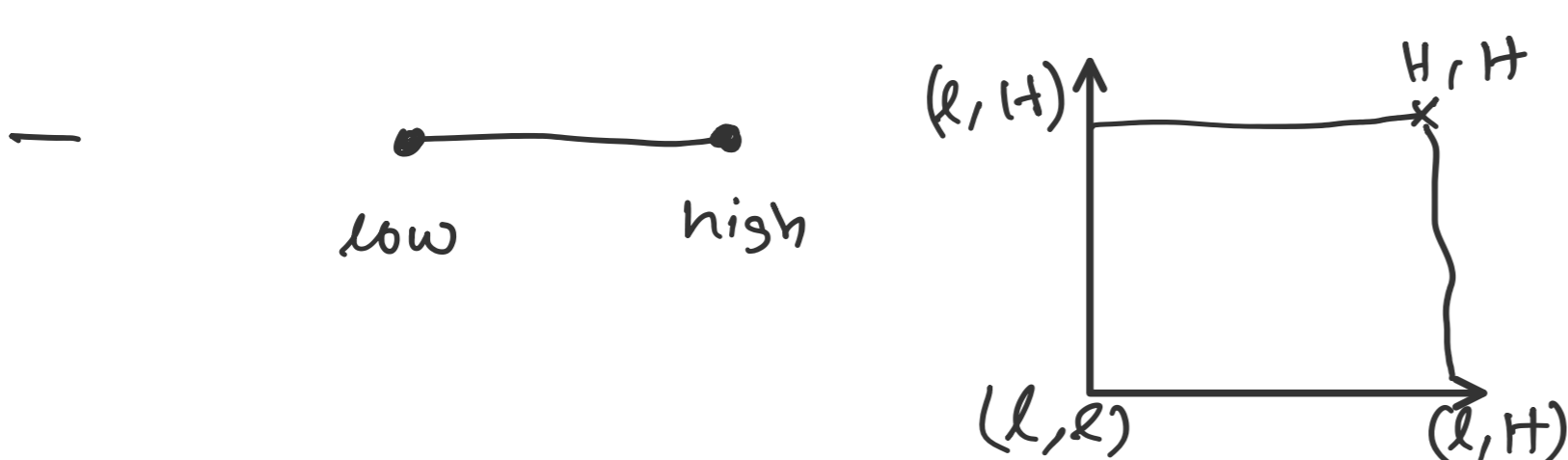
Full factorial design

- n factors f_1, f_2, \dots, f_n

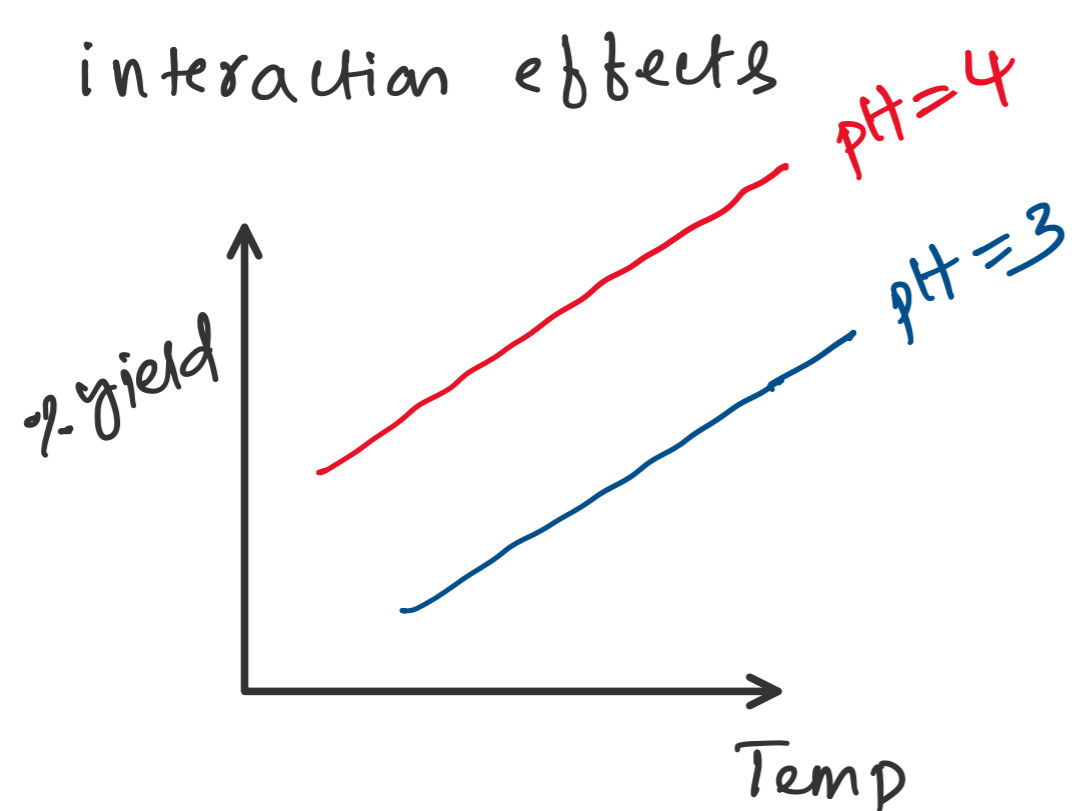
$f \rightarrow$ (low, high) Totally 2^n points in the n-dimensional space

- pH, Temperature, Catalyst, concentration of the species

- 2-level n-factorial designs

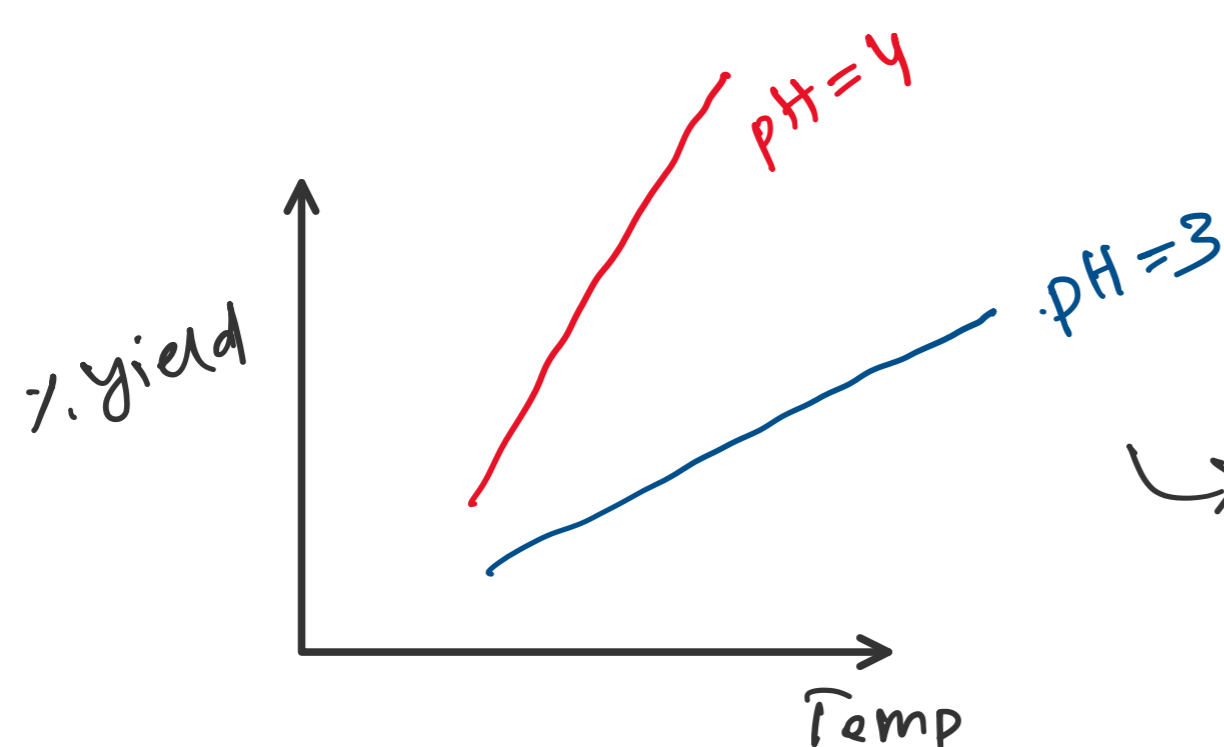


- interaction effects



→ linear relationship w/ a particular slope

→ additive effects w/o changing the underlying linear effect



→ interaction effects between pH and Temp

- 2^n points (exponential growth).

- Screening design : fractional factorial design

A B AB
A B C AB, AC, BC, ABC

- Reaction Temp, Conc, Catalyst A/B

measure : % yield $2^3 = 8$

T	Conc	Catalyst	Yield
160	20	A	60
180	20	A	72
160	40	A	54
180	40	A	68
160	20	B	52
180	20	B	83
160	40	B	45
180	40	B	80

effect of T, cat=A

$$\frac{(72+68) - (60+54)}{2} = \frac{114-114}{2} = \frac{-52}{2}$$

effect of T, cat=B

$$\frac{(80+83) - (52+45)}{2} = \frac{-16}{4}$$

$$\text{interaction (T by cat)} = \frac{-26}{4} + \frac{66}{4} = 10$$

a) Main effect of each factor.

$$\frac{y(T=160)}{4} - \frac{y(T=180)}{4}$$

b) interaction effects : (Temperature by Catalyst)

$$\left[\frac{\text{effects at cat=A} - \text{effects when cat=B}}{\text{Temperature}} \right] / 2$$

