

Interaction Effects:

✓

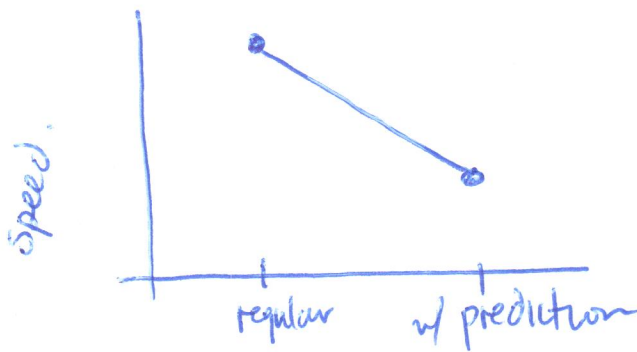
- These happen in factorial designs when two (or more) variables we control have some combined effect — an effect that cannot be simply explained by one factor or another.

- Note: combined effect may be positive or negative.

- sugar & milk in coffee; smoking & asbestos.

Simple experiment: ~~keyboards~~

typing speed given regular Qwerty vs. Qwerty w prediction.

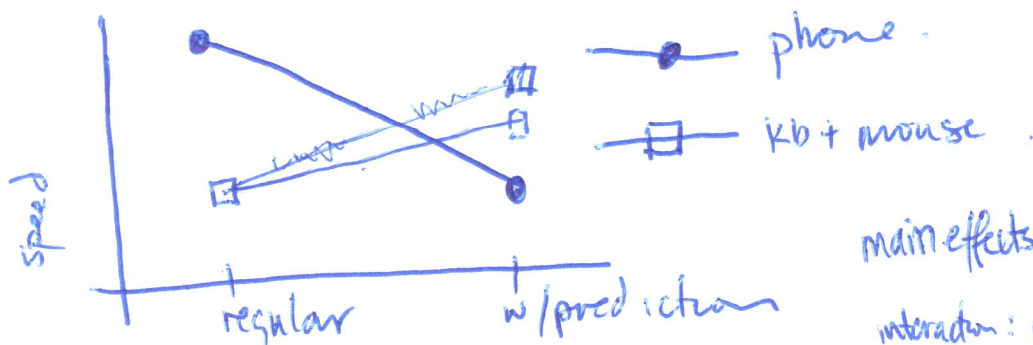


More complex:

typing speed w/ regular vs. w/ prediction

w/ phone vs. w/ keyboard + mouse.

⇒ "2x2 factorial design"

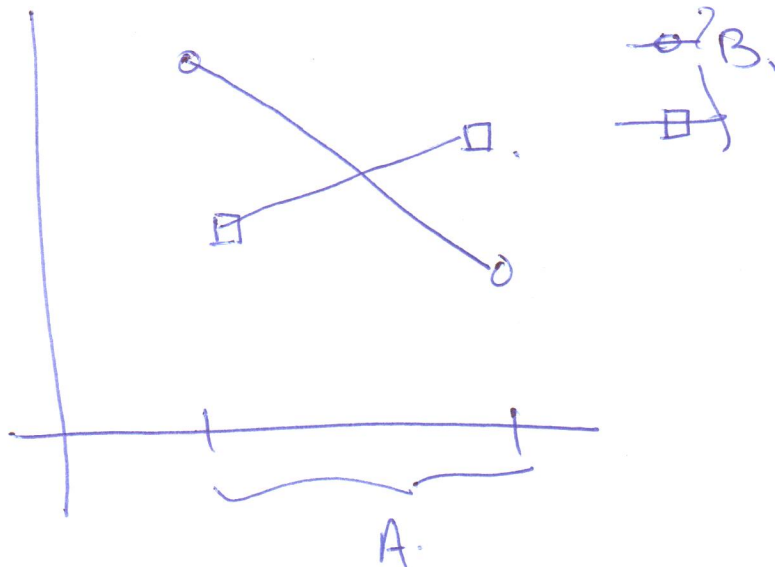


main effects: regular > w/prediction
phone > kb.

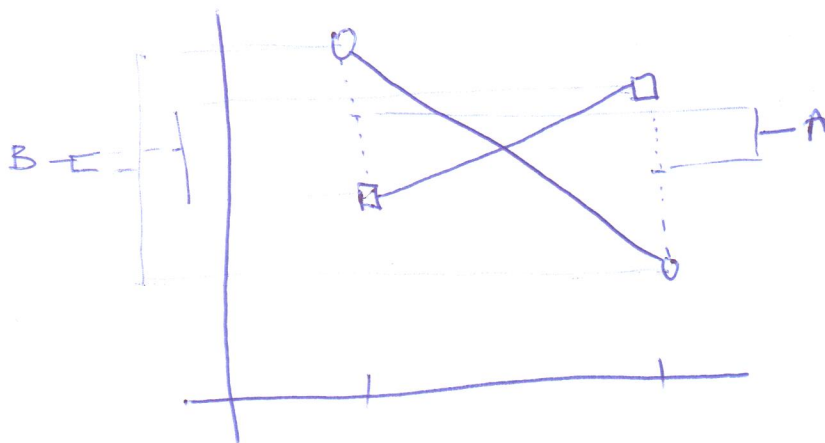
interaction: non-parallel.

READING INTERACTION EFFECTS

1.5 /



2 levels of factor A
2 levels of factor B.



~~Interac~~

$A \times B$ = are lines parallel?

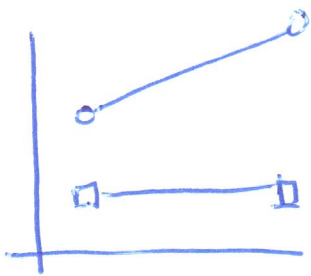
A: diff.

B: diff.

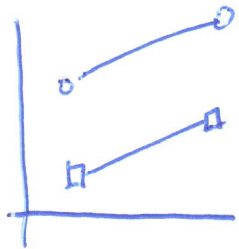
Read main effect for A:
are the averages at each level a_1 & a_2 equal?
If not \Rightarrow main effect.

Read main effect for B:
are the averages at each level b_1 & b_2 equal?
If not \Rightarrow main effect.

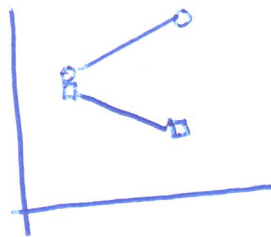
Read interaction effect:
are lines parallel?
if not \Rightarrow interaction effect



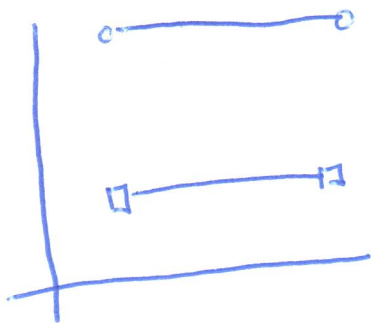
both main effects & interaction.



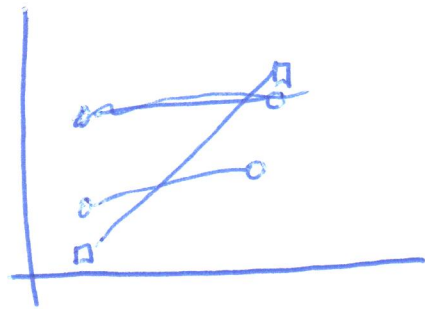
both main effects, no interaction.



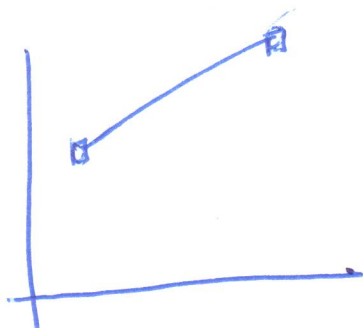
~~both main effect,~~
one main effect, interaction.



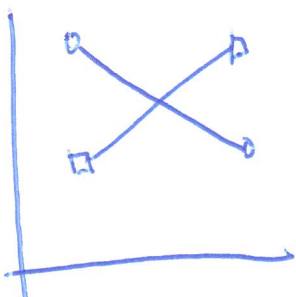
one main effect
no interaction



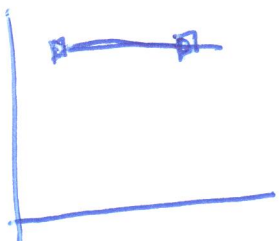
one main
no interaction.



one main
no int



interaction,
no mains



no mains,
no interactions

In practice, we simply account for this with a brand new term: SS_{AB} .

$$SS_{TOTAL} = SS_A + SS_B + SS_{AB} + SS_{Error}.$$

↳ "SS within" or individual variation / measurement error

↳ due to interaction

↳ due to factor B

↳ due to factor A.

How to calculate these terms: there are a number of different "types". In practice, we use Type III. B/c calculation is not imp't to do by hand, I'll skip it.

"Lengths of worms".

