

## TWO FACTOR ANOVA

### Interactions

REVIEW: Definition of Interaction

Two Independent Variables (IV1 & IV2) are said to interact if...

### Detailed Example:

It is well known that the color of objects affects how easy it is to see them. A scientist wants to change the color of fire engines from red to greenish yellow. He thinks that red is about as easy to see in bright light, but that as the light gets dimmer the greenish-yellow will be easier to see than the red.

So he runs a study in a lab in which subjects fixate on the center of a screen and blotches of color are projected onto random locations on the screen for a short period of time. The subject is to say when he or she detects a color splotch and to name the color. The experimenter has two independent variables: The color of the splotch (red or greenish-yellow) and the illumination level (bright as sunlight, bright as overcast day, and bright as night in a city). The dependent variable is the number of times the subject detects a color splotch out the twenty times that it is shown.

What is DV?

Abstractly

What are IV's?

What are the levels of the IV's?

How might interactions work in this example?

Verbally, If there IS an interaction:

Verbally, If there is NOT an interaction:

Graphically:



Interaction



No Interaction

### THREE CLASSES OF SCIENTIFIC HYPOTHESIS

Main effect of Color

Main effect of ...

Interaction effect

Are these effects due to chance?

### THREE KINDS OF EFFECTS



**E.G., PSYCHOTHERAPY, PRESENTING PROBLEM, & FUNCTIONING**

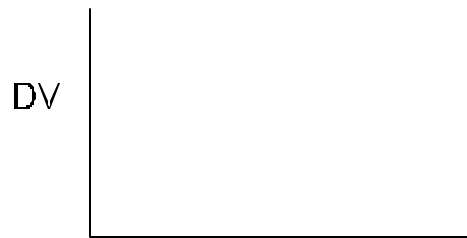
Table of Means




Main effect of ....



Main effect of...



Interaction Effect

**THREE F TESTS**

## Color, Illumination &amp; Delectability



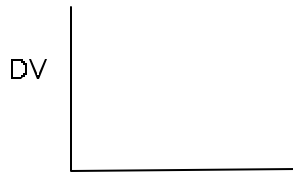
Interaction



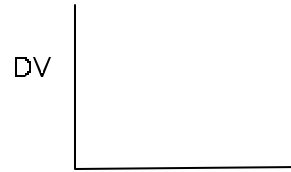
No interaction

**On your own:**

- ! If the data followed the **Interaction graph**, above, make a graph of the two main effects

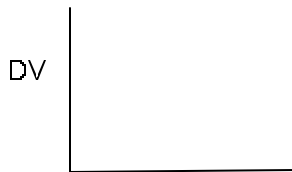


Main effect of Illumination

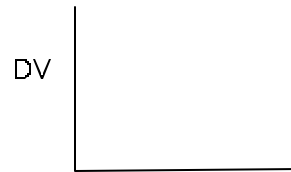


Main effect of Color

- ! If the data followed the **NO-Interaction graph**, above, make a graph of the two main effects



Main effect of Illumination



Main effect of Color

ANOVA SUMMARY TABLE

<i>Source</i>	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>p</i>

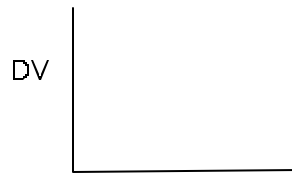
Which pattern of results (interaction or no interaction) does this ANOVA Summary Table go with?

Notice: Even though there is no significant Main Effect of....

### PATTERNS OF RESULTS

MAIN EFFECT OF A

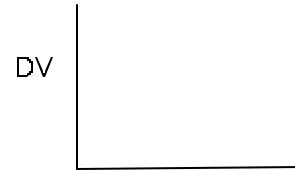

A  
B  
AB



Is there an AxB interaction?



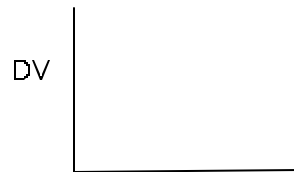
Is there a Main Effect of A?



Is there a Main effect of B?

MAIN EFFECT OF B

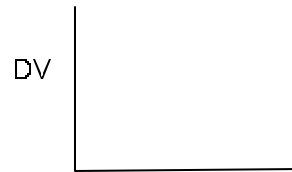

**A**  
**B**  
**AB**



Is there an AxB interaction?



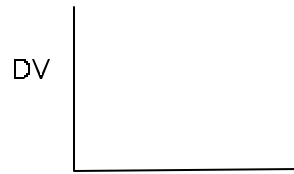
Is there a Main Effect of A?



Is there a Main effect of B?

MAIN A, MAIN B

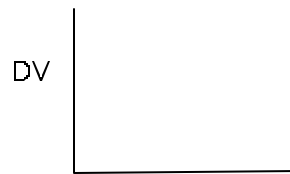

**A**  
**B**  
**AB**



Is there an AxB interaction?



Is there a Main Effect of A?



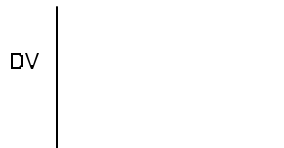
Is there a Main effect of B?

MAIN A, MAIN B, & AB INTERACTION


**A**  
**B**  
**AB**



Is there an AxB interaction?



Is there a Main Effect of A?



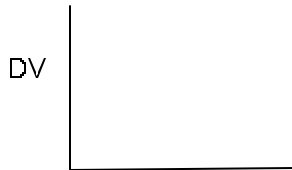
Is there a Main effect of B?

MAIN A & AB INTERACTION

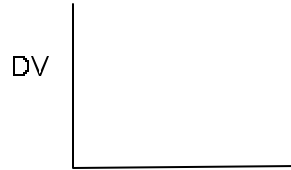

**A**  
**B**  
**AB**



Is there an AxB interaction?



Is there a Main Effect of A?



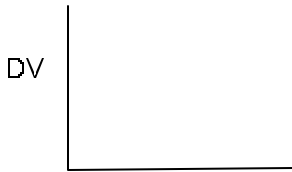
Is there a Main effect of B?

MAIN B & AB INTERACTION

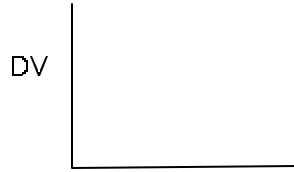

**A**  
**B**  
**AB**



Is there an AxB interaction?



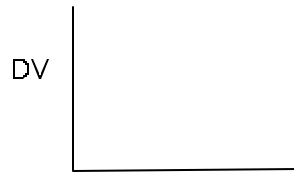
Is there a Main Effect of A?



Is there a Main effect of B?

AB INTERACTION

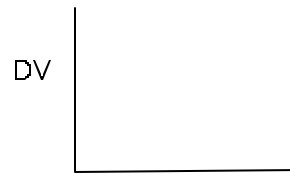

**A**  
**B**  
**AB**



Is there an AxB interaction?



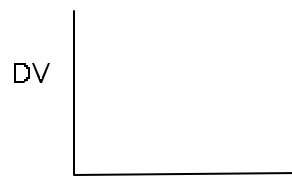
Is there a Main Effect of A?



Is there a Main effect of B?

NOTHING SIGNIFICANT

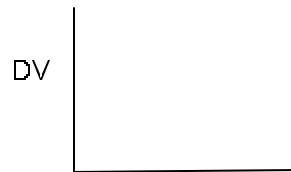

**A**  
**B**  
**AB**



Is there an AxB interaction?



Is there a Main Effect of A?



Is there a Main effect of B?