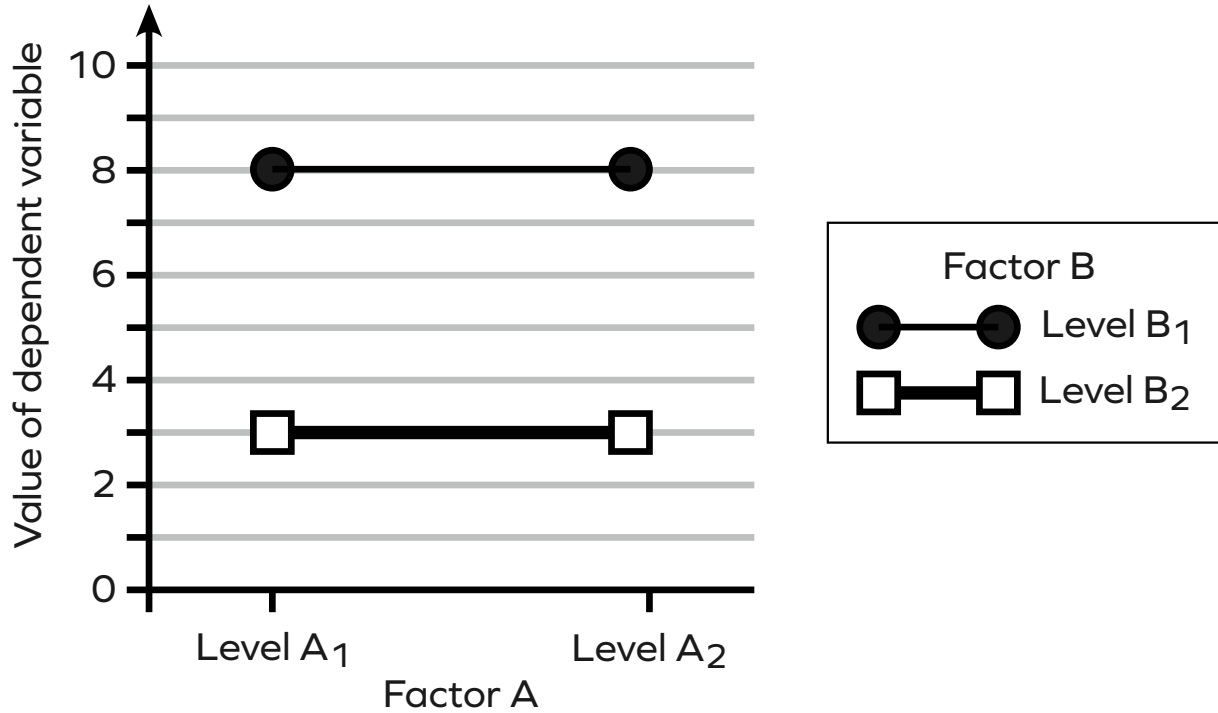


## **Topic 4: Identifying Main Effects, Simple Main Effects and Interactions**

On the next few pages are a series of exercises in which you will be identifying and interpreting various effects from interaction plots. Some pages are intentionally blank for convenience so that certain questions are on facing pages. The first exercise begins on page 3.



**A) Consider the following interaction plot**



1) Identify the value of each of the four cell means from the graph above

<b>A<sub>1</sub>B<sub>1</sub> cell mean:</b>	<b>A<sub>2</sub>B<sub>1</sub> cell mean:</b>
<b>A<sub>1</sub>B<sub>2</sub> cell mean:</b>	<b>A<sub>2</sub>B<sub>2</sub> cell mean:</b>

2) For each of the level means:

- Identify the pair of cell mean numerical values that comprise its components
- Calculate the value of the level mean

Level mean	Comprising cell means	Value of mean	Level mean	Comprising cell means	Value of mean
<b>A<sub>1</sub></b>			<b>B<sub>1</sub></b>		
<b>A<sub>2</sub></b>			<b>B<sub>2</sub></b>		

**3) For each the two Main Effects:**

- Identify the appropriate pair of level means that are compared to test the effect
- Find the size of the Main Effect (the difference between the pair of means)
- Determine whether the Main Effect is significant

Main Effect	Pair of means to be compared	Size of effect	Significant effect?
<b>A</b> (A <sub>1</sub> vs. A <sub>2</sub> )			<b>Y   N</b>
<b>B</b> (B <sub>1</sub> vs. B <sub>2</sub> )			<b>Y   N</b>

*Assume that a pair of means differs significantly if their difference is **THREE** or more*

**4) For each of the four Simple Main Effects:**

- Identify the appropriate pair of cell means that are compared to test the effect
- Find the size of the Simple Main Effect (the difference between the pair of means)
- Determine whether the Simple Main Effect is significant

Simple Main Effect	Pair of means to be compared	Size of effect	Significant effect?
<b>A at B<sub>1</sub></b> (A <sub>1</sub> B <sub>1</sub> vs. A <sub>2</sub> B <sub>1</sub> )			<b>Y   N</b>
<b>A at B<sub>2</sub></b> (A <sub>1</sub> B <sub>2</sub> vs. A <sub>2</sub> B <sub>2</sub> )			<b>Y   N</b>
<b>B at A<sub>1</sub></b> (A <sub>1</sub> B <sub>1</sub> vs. A <sub>1</sub> B <sub>2</sub> )			<b>Y   N</b>
<b>B at A<sub>2</sub></b> (A <sub>2</sub> B <sub>1</sub> vs. A <sub>2</sub> B <sub>2</sub> )			<b>Y   N</b>

*Assume that a pair of means differs significantly if their difference is **THREE** or more*

For the next two questions, a pair of effects are in *statistical agreement* with each other if either of the following is true (otherwise they *disagree*):

- a) Both effects are *significant* and in the *same direction*, the sizes of the effects do not matter
- b) Both effects are *non-significant*, in which case the sizes and directions of the effects are irrelevant

5) Are any of the following pairs of effects in statistical agreement?

- a) Simple Main Effect of A at B<sub>1</sub>, Simple Main Effect of A at B<sub>2</sub>? **A | D**
- b) Main effect of A, Simple Main Effect of A at B<sub>1</sub> **A | D**
- c) Main effect of A, Simple Main Effect of A at B<sub>2</sub> **A | D**

d) Do any of your answers for (a) to (c) above imply a significant interaction? **Y | N**

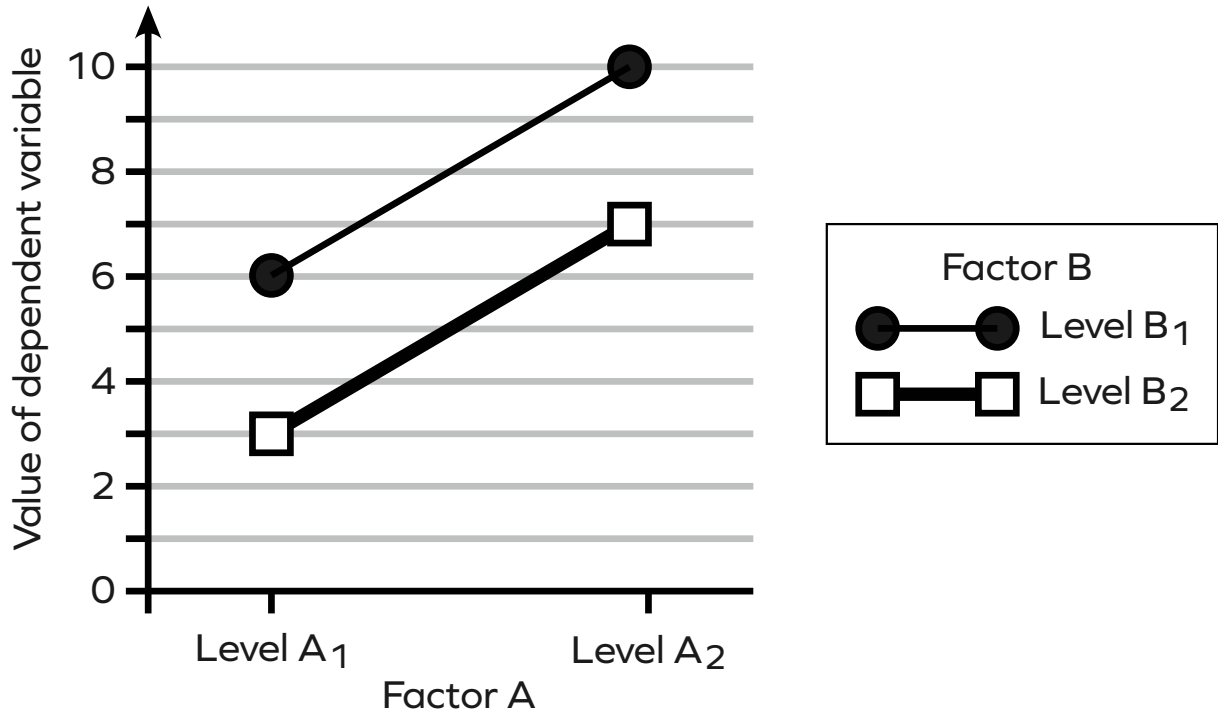
6) Are any of the following pairs of effects in statistical agreement?

- a) Simple Main Effect of B at A<sub>1</sub>, Simple Main Effect of B at A<sub>2</sub>? **A | D**
- b) Main effect of B, Simple Main Effect of B at A<sub>1</sub> **A | D**
- c) Main effect of B, Simple Main Effect of B at A<sub>2</sub> **A | D**

d) Do any of your answers for (a) to (c) above imply a significant interaction? **Y | N**



**B) Consider the following interaction plot**



1) Identify the value of each of the four cell means from the graph above

<b>A<sub>1</sub>B<sub>1</sub> cell mean:</b>	<b>A<sub>2</sub>B<sub>1</sub> cell mean:</b>
<b>A<sub>1</sub>B<sub>2</sub> cell mean:</b>	<b>A<sub>2</sub>B<sub>2</sub> cell mean:</b>

2) For each of the level means:

- a) Identify the pair of cell mean numerical values that comprise its components
- b) Calculate the value of the level mean

Level mean	Comprising cell means	Value of mean	Level mean	Comprising cell means	Value of mean
<b>A<sub>1</sub></b>			<b>B<sub>1</sub></b>		
<b>A<sub>2</sub></b>			<b>B<sub>2</sub></b>		

**3) For each the two Main Effects:**

- a) Identify the appropriate pair of level means that are compared to test the effect
- b) Find the size of the Main Effect (the difference between the pair of means)
- c) Determine whether the Main Effect is significant

Main Effect	Pair of means to be compared	Size of effect	Significant effect?
<b>A</b> (A <sub>1</sub> vs. A <sub>2</sub> )			<b>Y   N</b>
<b>B</b> (B <sub>1</sub> vs. B <sub>2</sub> )			<b>Y   N</b>

*Assume that a pair of means differs significantly if their difference is **THREE** or more*

**4) For each of the four Simple Main Effects:**

- a) Identify the appropriate pair of cell means that are compared to test the effect
- b) Find the size of the Simple Main Effect (the difference between the pair of means)
- c) Determine whether the Simple Main Effect is significant

Simple Main Effect	Pair of means to be compared	Size of effect	Significant effect?
<b>A at B<sub>1</sub></b> (A <sub>1</sub> B <sub>1</sub> vs. A <sub>2</sub> B <sub>1</sub> )			<b>Y   N</b>
<b>A at B<sub>2</sub></b> (A <sub>1</sub> B <sub>2</sub> vs. A <sub>2</sub> B <sub>2</sub> )			<b>Y   N</b>
<b>B at A<sub>1</sub></b> (A <sub>1</sub> B <sub>1</sub> vs. A <sub>1</sub> B <sub>2</sub> )			<b>Y   N</b>
<b>B at A<sub>2</sub></b> (A <sub>2</sub> B <sub>1</sub> vs. A <sub>2</sub> B <sub>2</sub> )			<b>Y   N</b>

*Assume that a pair of means differs significantly if their difference is **THREE** or more*



For the next two questions, a pair of effects are in *statistical agreement* with each other if either of the following is true (otherwise they *disagree*):

- a) Both effects are *significant* and in the *same direction*, the sizes of the effects do not matter
- b) Both effects are *non-significant*, in which case the sizes and directions of the effects are irrelevant

5) Are any of the following pairs of effects in statistical agreement?

- a) Simple Main Effect of A at B<sub>1</sub>, Simple Main Effect of A at B<sub>2</sub>? **A | D**
- b) Main effect of A, Simple Main Effect of A at B<sub>1</sub> **A | D**
- c) Main effect of A, Simple Main Effect of A at B<sub>2</sub> **A | D**

d) Do any of your answers for (a) to (c) above imply a significant interaction? **Y | N**

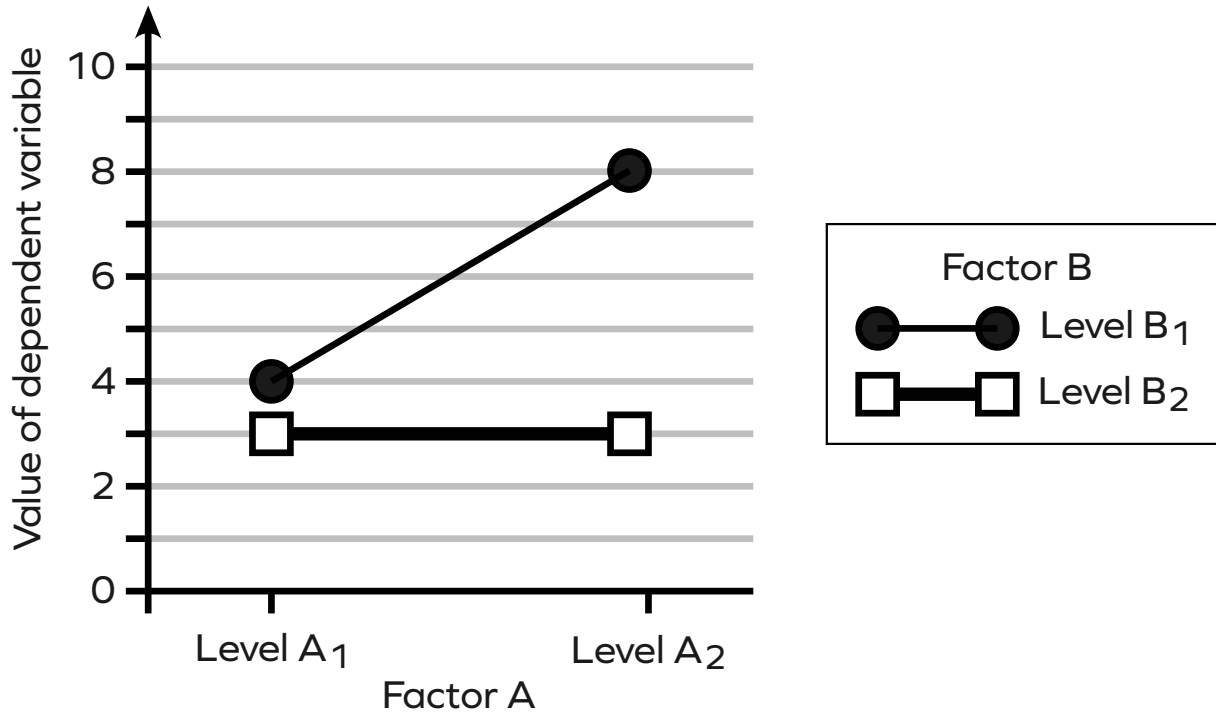
6) Are any of the following pairs of effects in statistical agreement?

- a) Simple Main Effect of B at A<sub>1</sub>, Simple Main Effect of B at A<sub>2</sub>? **A | D**
- b) Main effect of B, Simple Main Effect of B at A<sub>1</sub> **A | D**
- c) Main effect of B, Simple Main Effect of B at A<sub>2</sub> **A | D**

d) Do any of your answers for (a) to (c) above imply a significant interaction? **Y | N**



**C) Consider the following interaction plot**



1) Identify the value of each of the four cell means from the graph above

<b>A<sub>1</sub>B<sub>1</sub> cell mean:</b>	<b>A<sub>2</sub>B<sub>1</sub> cell mean:</b>
<b>A<sub>1</sub>B<sub>2</sub> cell mean:</b>	<b>A<sub>2</sub>B<sub>2</sub> cell mean:</b>

2) For each of the level means:

- Identify the pair of cell mean numerical values that comprise its components
- Calculate the value of the level mean

Level mean	Comprising cell means	Value of mean	Level mean	Comprising cell means	Value of mean
<b>A<sub>1</sub></b>			<b>B<sub>1</sub></b>		
<b>A<sub>2</sub></b>			<b>B<sub>2</sub></b>		

**3) For each the two Main Effects:**

- Identify the appropriate pair of level means that are compared to test the effect
- Find the size of the Main Effect (the difference between the pair of means)
- Determine whether the Main Effect is significant

Main Effect	Pair of means to be compared	Size of effect	Significant effect?
<b>A</b> (A <sub>1</sub> vs. A <sub>2</sub> )			<b>Y   N</b>
<b>B</b> (B <sub>1</sub> vs. B <sub>2</sub> )			<b>Y   N</b>

*Assume that a pair of means differs significantly if their difference is **THREE** or more*

**4) For each of the four Simple Main Effects:**

- Identify the appropriate pair of cell means that are compared to test the effect
- Find the size of the Simple Main Effect (the difference between the pair of means)
- Determine whether the Simple Main Effect is significant

Simple Main Effect	Pair of means to be compared	Size of effect	Significant effect?
<b>A at B<sub>1</sub></b> (A <sub>1</sub> B <sub>1</sub> vs. A <sub>2</sub> B <sub>1</sub> )			<b>Y   N</b>
<b>A at B<sub>2</sub></b> (A <sub>1</sub> B <sub>2</sub> vs. A <sub>2</sub> B <sub>2</sub> )			<b>Y   N</b>
<b>B at A<sub>1</sub></b> (A <sub>1</sub> B <sub>1</sub> vs. A <sub>1</sub> B <sub>2</sub> )			<b>Y   N</b>
<b>B at A<sub>2</sub></b> (A <sub>2</sub> B <sub>1</sub> vs. A <sub>2</sub> B <sub>2</sub> )			<b>Y   N</b>

*Assume that a pair of means differs significantly if their difference is **THREE** or more*

For the next two questions, a pair of effects are in *statistical agreement* with each other if either of the following is true (otherwise they *disagree*):

- a) Both effects are *significant* and in the *same direction*, the sizes of the effects do not matter
- b) Both effects are *non-significant*, in which case the sizes and directions of the effects are irrelevant

5) Are any of the following pairs of effects in statistical agreement?

- a) Simple Main Effect of A at B<sub>1</sub>, Simple Main Effect of A at B<sub>2</sub>? **A | D**
- b) Main effect of A, Simple Main Effect of A at B<sub>1</sub> **A | D**
- c) Main effect of A, Simple Main Effect of A at B<sub>2</sub> **A | D**

d) Do any of your answers for (a) to (c) above imply a significant interaction? **Y | N**

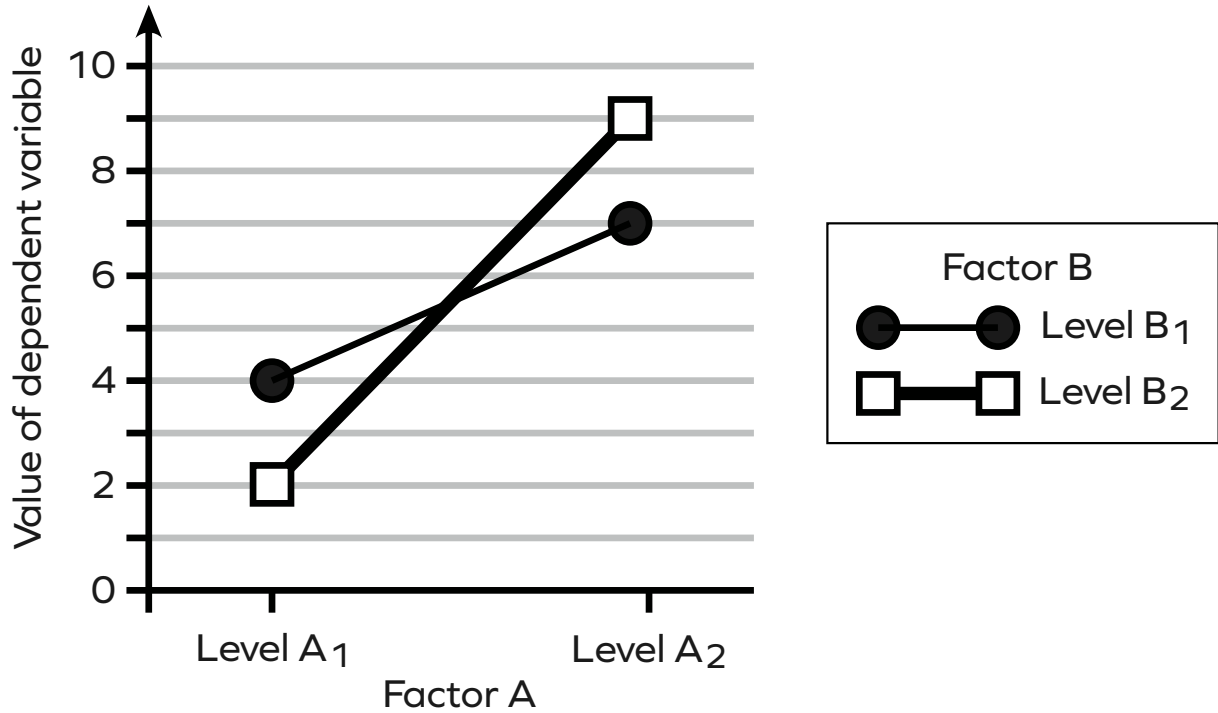
6) Are any of the following pairs of effects in statistical agreement?

- a) Simple Main Effect of B at A<sub>1</sub>, Simple Main Effect of B at A<sub>2</sub>? **A | D**
- b) Main effect of B, Simple Main Effect of B at A<sub>1</sub> **A | D**
- c) Main effect of B, Simple Main Effect of B at A<sub>2</sub> **A | D**

d) Do any of your answers for (a) to (c) above imply a significant interaction? **Y | N**



**D) Consider the following interaction plot**



1) Identify the value of each of the four cell means from the graph above

$A_1B_1$ cell mean:	$A_2B_1$ cell mean:
$A_1B_2$ cell mean:	$A_2B_2$ cell mean:

2) For each of the level means:

- a) Identify the pair of cell mean numerical values that comprise its components
- b) Calculate the value of the level mean

Level mean	Comprising cell means	Value of mean	Level mean	Comprising cell means	Value of mean
$A_1$			$B_1$		
$A_2$			$B_2$		

**3) For each the two Main Effects:**

- Identify the appropriate pair of level means that are compared to test the effect
- Find the size of the Main Effect (the difference between the pair of means)
- Determine whether the Main Effect is significant

Main Effect	Pair of means to be compared	Size of effect	Significant effect?
<b>A</b> (A <sub>1</sub> vs. A <sub>2</sub> )			<b>Y   N</b>
<b>B</b> (B <sub>1</sub> vs. B <sub>2</sub> )			<b>Y   N</b>

Assume that a pair of means differs significantly if their difference is **THREE** or more

**4) For each of the four Simple Main Effects:**

- Identify the appropriate pair of cell means that are compared to test the effect
- Find the size of the Simple Main Effect (the difference between the pair of means)
- Determine whether the Simple Main Effect is significant

Simple Main Effect	Pair of means to be compared	Size of effect	Significant effect?
<b>A at B<sub>1</sub></b> (A <sub>1</sub> B <sub>1</sub> vs. A <sub>2</sub> B <sub>1</sub> )			<b>Y   N</b>
<b>A at B<sub>2</sub></b> (A <sub>1</sub> B <sub>2</sub> vs. A <sub>2</sub> B <sub>2</sub> )			<b>Y   N</b>
<b>B at A<sub>1</sub></b> (A <sub>1</sub> B <sub>1</sub> vs. A <sub>1</sub> B <sub>2</sub> )			<b>Y   N</b>
<b>B at A<sub>2</sub></b> (A <sub>2</sub> B <sub>1</sub> vs. A <sub>2</sub> B <sub>2</sub> )			<b>Y   N</b>

Assume that a pair of means differs significantly if their difference is **THREE** or more



For the next two questions, a pair of effects are in *statistical agreement* with each other if either of the following is true (otherwise they *disagree*):

- a) Both effects are *significant* and in the *same direction*, the sizes of the effects do not matter
- b) Both effects are *non-significant*, in which case the sizes and directions of the effects are irrelevant

5) Are any of the following pairs of effects in statistical agreement?

- a) Simple Main Effect of A at B<sub>1</sub>, Simple Main Effect of A at B<sub>2</sub>? **A | D**
- b) Main effect of A, Simple Main Effect of A at B<sub>1</sub> **A | D**
- c) Main effect of A, Simple Main Effect of A at B<sub>2</sub> **A | D**

d) Do any of your answers for (a) to (c) above imply a significant interaction? **Y | N**

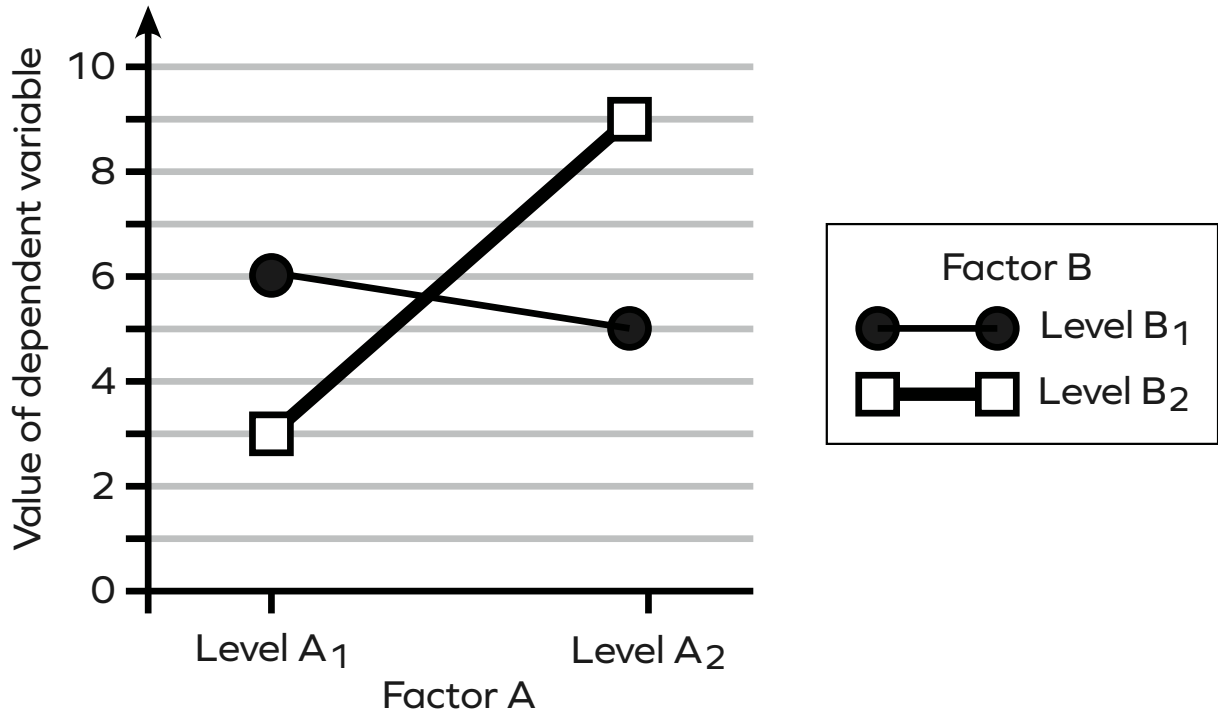
6) Are any of the following pairs of effects in statistical agreement?

- a) Simple Main Effect of B at A<sub>1</sub>, Simple Main Effect of B at A<sub>2</sub>? **A | D**
- b) Main effect of B, Simple Main Effect of B at A<sub>1</sub> **A | D**
- c) Main effect of B, Simple Main Effect of B at A<sub>2</sub> **A | D**

d) Do any of your answers for (a) to (c) above imply a significant interaction? **Y | N**



**E) Consider the following interaction plot**



1) Identify the value of each of the four cell means from the graph above

$A_1B_1$ cell mean:	$A_2B_1$ cell mean:
$A_1B_2$ cell mean:	$A_2B_2$ cell mean:

2) For each of the level means:

- a) Identify the pair of cell mean numerical values that comprise its components
- b) Calculate the value of the level mean

Level mean	Comprising cell means	Value of mean	Level mean	Comprising cell means	Value of mean
$A_1$			$B_1$		
$A_2$			$B_2$		

**3) For each the two Main Effects:**

- a) Identify the appropriate pair of level means that are compared to test the effect
- b) Find the size of the Main Effect (the difference between the pair of means)
- c) Determine whether the Main Effect is significant

Main Effect	Pair of means to be compared	Size of effect	Significant effect?
<b>A</b> (A <sub>1</sub> vs. A <sub>2</sub> )			<b>Y   N</b>
<b>B</b> (B <sub>1</sub> vs. B <sub>2</sub> )			<b>Y   N</b>

*Assume that a pair of means differs significantly if their difference is **THREE** or more*

**4) For each of the four Simple Main Effects:**

- a) Identify the appropriate pair of cell means that are compared to test the effect
- b) Find the size of the Simple Main Effect (the difference between the pair of means)
- c) Determine whether the Simple Main Effect is significant

Simple Main Effect	Pair of means to be compared	Size of effect	Significant effect?
<b>A at B<sub>1</sub></b> (A <sub>1</sub> B <sub>1</sub> vs. A <sub>2</sub> B <sub>1</sub> )			<b>Y   N</b>
<b>A at B<sub>2</sub></b> (A <sub>1</sub> B <sub>2</sub> vs. A <sub>2</sub> B <sub>2</sub> )			<b>Y   N</b>
<b>B at A<sub>1</sub></b> (A <sub>1</sub> B <sub>1</sub> vs. A <sub>1</sub> B <sub>2</sub> )			<b>Y   N</b>
<b>B at A<sub>2</sub></b> (A <sub>2</sub> B <sub>1</sub> vs. A <sub>2</sub> B <sub>2</sub> )			<b>Y   N</b>

*Assume that a pair of means differs significantly if their difference is **THREE** or more*

For the next two questions, a pair of effects are in *statistical agreement* with each other if either of the following is true (otherwise they *disagree*):

- a) Both effects are *significant* and in the *same direction*, the sizes of the effects do not matter
- b) Both effects are *non-significant*, in which case the sizes and directions of the effects are irrelevant

5) Are any of the following pairs of effects in statistical agreement?

- a) Simple Main Effect of A at B<sub>1</sub>, Simple Main Effect of A at B<sub>2</sub>? **A | D**
- b) Main effect of A, Simple Main Effect of A at B<sub>1</sub> **A | D**
- c) Main effect of A, Simple Main Effect of A at B<sub>2</sub> **A | D**

d) Do any of your answers for (a) to (c) above imply a significant interaction? **Y | N**

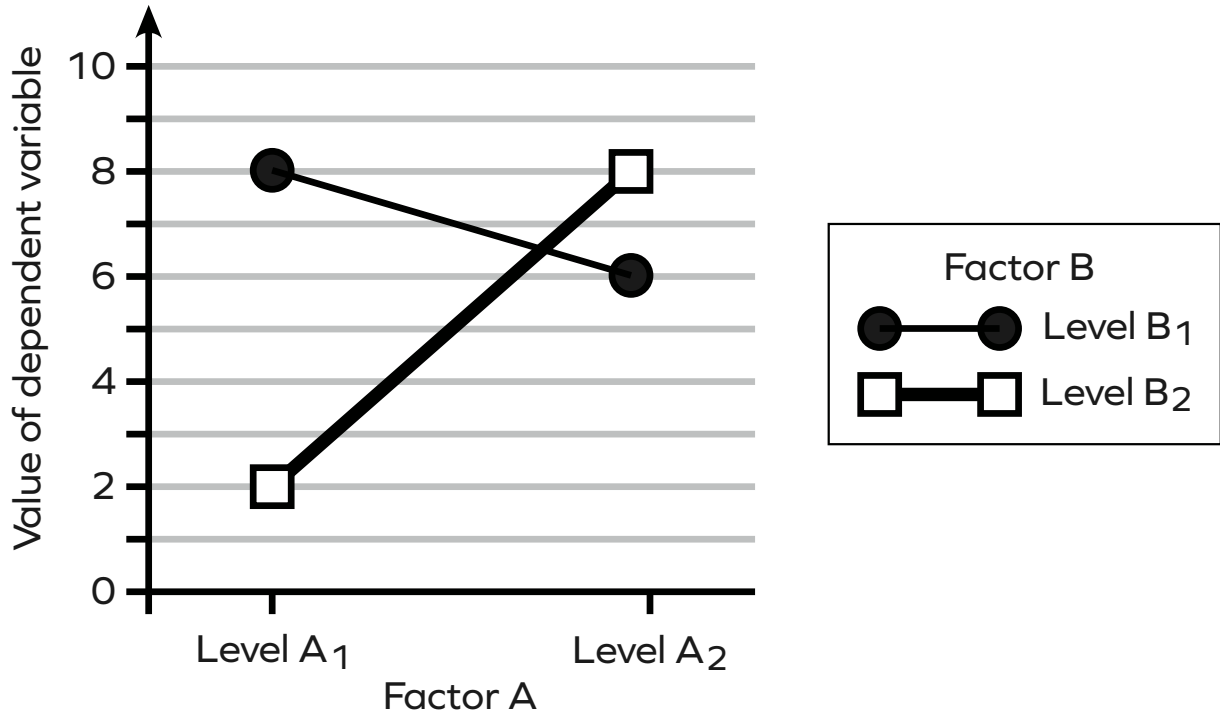
6) Are any of the following pairs of effects in statistical agreement?

- a) Simple Main Effect of B at A<sub>1</sub>, Simple Main Effect of B at A<sub>2</sub>? **A | D**
- b) Main effect of B, Simple Main Effect of B at A<sub>1</sub> **A | D**
- c) Main effect of B, Simple Main Effect of B at A<sub>2</sub> **A | D**

d) Do any of your answers for (a) to (c) above imply a significant interaction? **Y | N**



**F) Consider the following interaction plot**



1) Identify the value of each of the four cell means from the graph above

<b>A<sub>1</sub>B<sub>1</sub> cell mean:</b>	<b>A<sub>2</sub>B<sub>1</sub> cell mean:</b>
<b>A<sub>1</sub>B<sub>2</sub> cell mean:</b>	<b>A<sub>2</sub>B<sub>2</sub> cell mean:</b>

2) For each of the level means:

- Identify the pair of cell mean numerical values that comprise its components
- Calculate the value of the level mean

Level mean	Comprising cell means	Value of mean	Level mean	Comprising cell means	Value of mean
<b>A<sub>1</sub></b>			<b>B<sub>1</sub></b>		
<b>A<sub>2</sub></b>			<b>B<sub>2</sub></b>		

**3) For each the two Main Effects:**

- Identify the appropriate pair of level means that are compared to test the effect
- Find the size of the Main Effect (the difference between the pair of means)
- Determine whether the Main Effect is significant

Main Effect	Pair of means to be compared	Size of effect	Significant effect?
<b>A</b> (A <sub>1</sub> vs. A <sub>2</sub> )			<b>Y   N</b>
<b>B</b> (B <sub>1</sub> vs. B <sub>2</sub> )			<b>Y   N</b>

*Assume that a pair of means differs significantly if their difference is **THREE** or more*

**4) For each of the four Simple Main Effects:**

- Identify the appropriate pair of cell means that are compared to test the effect
- Find the size of the Simple Main Effect (the difference between the pair of means)
- Determine whether the Simple Main Effect is significant

Simple Main Effect	Pair of means to be compared	Size of effect	Significant effect?
<b>A at B<sub>1</sub></b> (A <sub>1</sub> B <sub>1</sub> vs. A <sub>2</sub> B <sub>1</sub> )			<b>Y   N</b>
<b>A at B<sub>2</sub></b> (A <sub>1</sub> B <sub>2</sub> vs. A <sub>2</sub> B <sub>2</sub> )			<b>Y   N</b>
<b>B at A<sub>1</sub></b> (A <sub>1</sub> B <sub>1</sub> vs. A <sub>1</sub> B <sub>2</sub> )			<b>Y   N</b>
<b>B at A<sub>2</sub></b> (A <sub>2</sub> B <sub>1</sub> vs. A <sub>2</sub> B <sub>2</sub> )			<b>Y   N</b>

*Assume that a pair of means differs significantly if their difference is **THREE** or more*



For the next two questions, a pair of effects are in *statistical agreement* with each other if either of the following is true (otherwise they *disagree*):

- a) Both effects are *significant* and in the *same direction*, the sizes of the effects do not matter
- b) Both effects are *non-significant*, in which case the sizes and directions of the effects are irrelevant

5) Are any of the following pairs of effects in statistical agreement?

- a) Simple Main Effect of A at B<sub>1</sub>, Simple Main Effect of A at B<sub>2</sub>? **A | D**
- b) Main effect of A, Simple Main Effect of A at B<sub>1</sub> **A | D**
- c) Main effect of A, Simple Main Effect of A at B<sub>2</sub> **A | D**

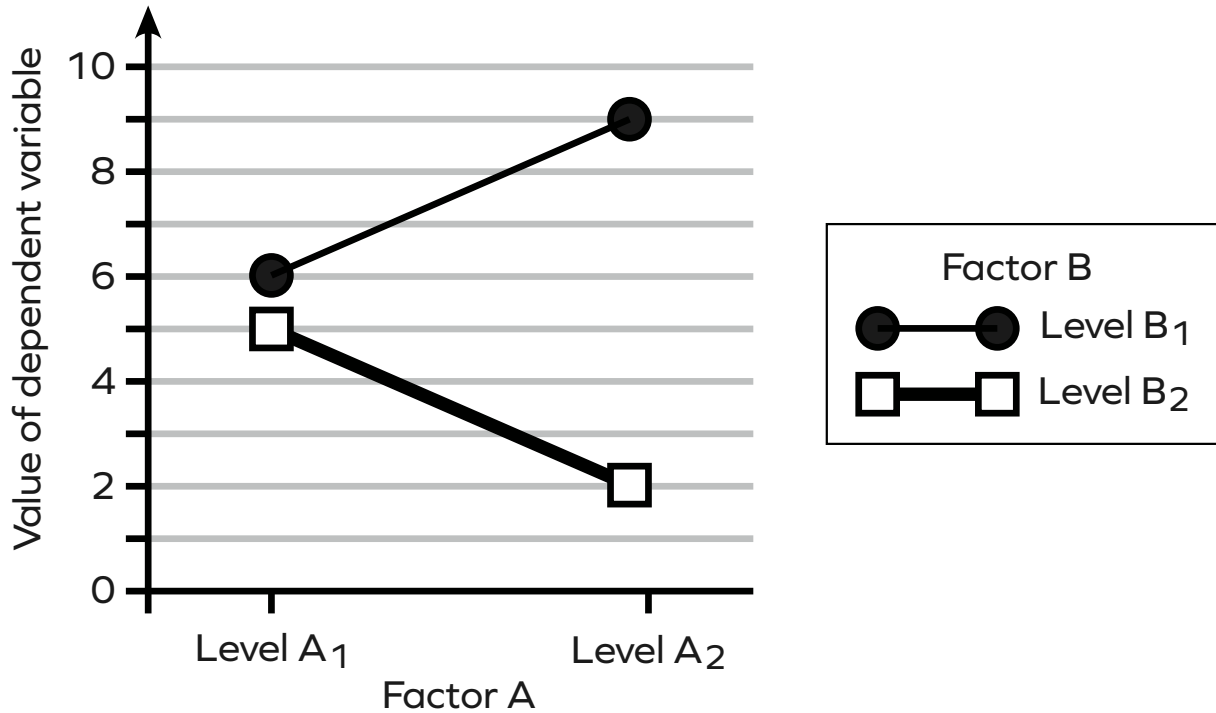
d) Do any of your answers for (a) to (c) above imply a significant interaction? **Y | N**

6) Are any of the following pairs of effects in statistical agreement?

- a) Simple Main Effect of B at A<sub>1</sub>, Simple Main Effect of B at A<sub>2</sub>? **A | D**
- b) Main effect of B, Simple Main Effect of B at A<sub>1</sub> **A | D**
- c) Main effect of B, Simple Main Effect of B at A<sub>2</sub> **A | D**

d) Do any of your answers for (a) to (c) above imply a significant interaction? **Y | N**

**G) Consider the following interaction plot**



1) Identify the value of each of the four cell means from the graph above

$A_1B_1$ cell mean:	$A_2B_1$ cell mean:
$A_1B_2$ cell mean:	$A_2B_2$ cell mean:

2) For each of the level means:

- Identify the pair of cell mean numerical values that comprise its components
- Calculate the value of the level mean

Level mean	Comprising cell means	Value of mean	Level mean	Comprising cell means	Value of mean
$A_1$			$B_1$		
$A_2$			$B_2$		

**3) For each the two Main Effects:**

- Identify the appropriate pair of level means that are compared to test the effect
- Find the size of the Main Effect (the difference between the pair of means)
- Determine whether the Main Effect is significant

Main Effect	Pair of means to be compared	Size of effect	Significant effect?
<b>A</b> (A <sub>1</sub> vs. A <sub>2</sub> )			<b>Y   N</b>
<b>B</b> (B <sub>1</sub> vs. B <sub>2</sub> )			<b>Y   N</b>

*Assume that a pair of means differs significantly if their difference is **THREE** or more*

**4) For each of the four Simple Main Effects:**

- Identify the appropriate pair of cell means that are compared to test the effect
- Find the size of the Simple Main Effect (the difference between the pair of means)
- Determine whether the Simple Main Effect is significant

Simple Main Effect	Pair of means to be compared	Size of effect	Significant effect?
<b>A at B<sub>1</sub></b> (A <sub>1</sub> B <sub>1</sub> vs. A <sub>2</sub> B <sub>1</sub> )			<b>Y   N</b>
<b>A at B<sub>2</sub></b> (A <sub>1</sub> B <sub>2</sub> vs. A <sub>2</sub> B <sub>2</sub> )			<b>Y   N</b>
<b>B at A<sub>1</sub></b> (A <sub>1</sub> B <sub>1</sub> vs. A <sub>1</sub> B <sub>2</sub> )			<b>Y   N</b>
<b>B at A<sub>2</sub></b> (A <sub>2</sub> B <sub>1</sub> vs. A <sub>2</sub> B <sub>2</sub> )			<b>Y   N</b>

*Assume that a pair of means differs significantly if their difference is **THREE** or more*

For the next two questions, a pair of effects are in *statistical agreement* with each other if either of the following is true (otherwise they *disagree*):

- a) Both effects are *significant* and in the *same direction*, the sizes of the effects do not matter
- b) Both effects are *non-significant*, in which case the sizes and directions of the effects are irrelevant

5) Are any of the following pairs of effects in statistical agreement?

- a) Simple Main Effect of A at B<sub>1</sub>, Simple Main Effect of A at B<sub>2</sub>? **A | D**
- b) Main effect of A, Simple Main Effect of A at B<sub>1</sub> **A | D**
- c) Main effect of A, Simple Main Effect of A at B<sub>2</sub> **A | D**

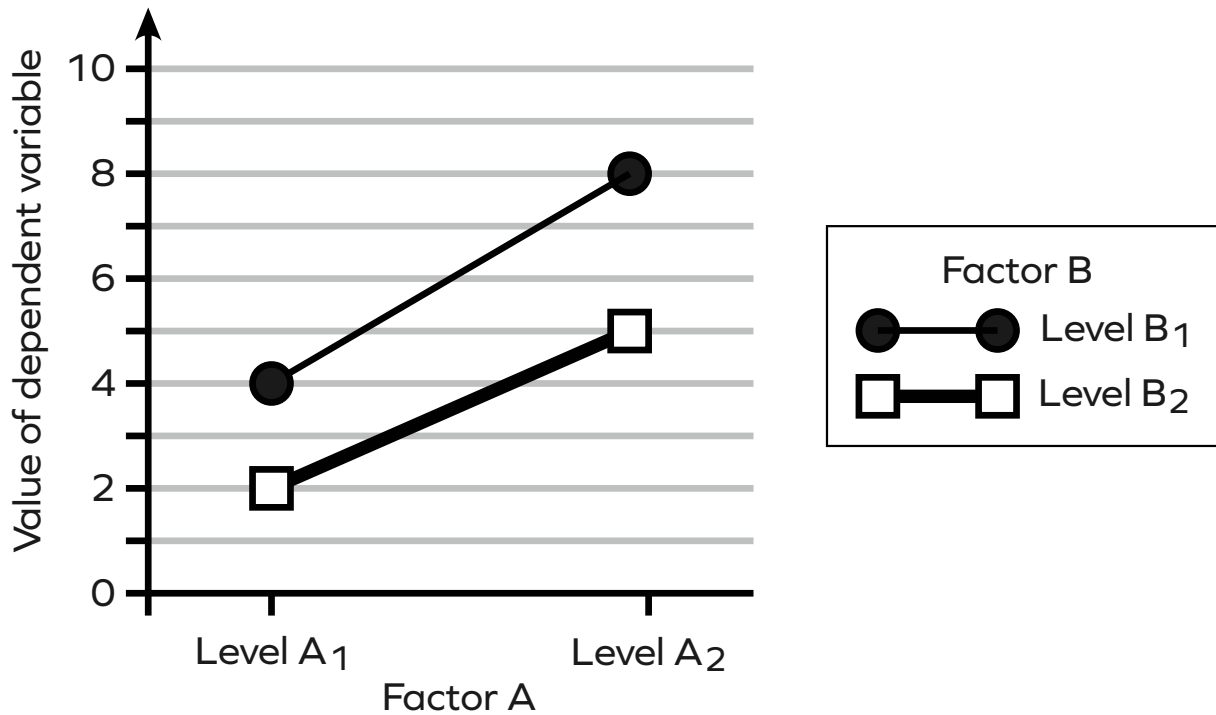
d) Do any of your answers for (a) to (c) above imply a significant interaction? **Y | N**

6) Are any of the following pairs of effects in statistical agreement?

- a) Simple Main Effect of B at A<sub>1</sub>, Simple Main Effect of B at A<sub>2</sub>? **A | D**
- b) Main effect of B, Simple Main Effect of B at A<sub>1</sub> **A | D**
- c) Main effect of B, Simple Main Effect of B at A<sub>2</sub> **A | D**

d) Do any of your answers for (a) to (c) above imply a significant interaction? **Y | N**

**H) Consider the following interaction plot**



1) Identify the value of each of the four cell means from the graph above

$A_1B_1$ cell mean:	$A_2B_1$ cell mean:
$A_1B_2$ cell mean:	$A_2B_2$ cell mean:

2) For each of the level means:

- Identify the pair of cell mean numerical values that comprise its components
- Calculate the value of the level mean

Level mean	Comprising cell means	Value of mean	Level mean	Comprising cell means	Value of mean
$A_1$			$B_1$		
$A_2$			$B_2$		

**3) For each the two Main Effects:**

- Identify the appropriate pair of level means that are compared to test the effect
- Find the size of the Main Effect (the difference between the pair of means)
- Determine whether the Main Effect is significant

Main Effect	Pair of means to be compared	Size of effect	Significant effect?
<b>A</b> (A <sub>1</sub> vs. A <sub>2</sub> )			<b>Y   N</b>
<b>B</b> (B <sub>1</sub> vs. B <sub>2</sub> )			<b>Y   N</b>

*Assume that a pair of means differs significantly if their difference is **THREE** or more*

**4) For each of the four Simple Main Effects:**

- Identify the appropriate pair of cell means that are compared to test the effect
- Find the size of the Simple Main Effect (the difference between the pair of means)
- Determine whether the Simple Main Effect is significant

Simple Main Effect	Pair of means to be compared	Size of effect	Significant effect?
<b>A at B<sub>1</sub></b> (A <sub>1</sub> B <sub>1</sub> vs. A <sub>2</sub> B <sub>1</sub> )			<b>Y   N</b>
<b>A at B<sub>2</sub></b> (A <sub>1</sub> B <sub>2</sub> vs. A <sub>2</sub> B <sub>2</sub> )			<b>Y   N</b>
<b>B at A<sub>1</sub></b> (A <sub>1</sub> B <sub>1</sub> vs. A <sub>1</sub> B <sub>2</sub> )			<b>Y   N</b>
<b>B at A<sub>2</sub></b> (A <sub>2</sub> B <sub>1</sub> vs. A <sub>2</sub> B <sub>2</sub> )			<b>Y   N</b>

*Assume that a pair of means differs significantly if their difference is **THREE** or more*

For the next two questions, a pair of effects are in *statistical agreement* with each other if either of the following is true (otherwise they *disagree*):

- a) Both effects are *significant* and in the *same direction*, the sizes of the effects do not matter
- b) Both effects are *non-significant*, in which case the sizes and directions of the effects are irrelevant

5) Are any of the following pairs of effects in statistical agreement?

- a) Simple Main Effect of A at B<sub>1</sub>, Simple Main Effect of A at B<sub>2</sub>? **A | D**
- b) Main effect of A, Simple Main Effect of A at B<sub>1</sub> **A | D**
- c) Main effect of A, Simple Main Effect of A at B<sub>2</sub> **A | D**

d) Do any of your answers for (a) to (c) above imply a significant interaction? **Y | N**

6) Are any of the following pairs of effects in statistical agreement?

- a) Simple Main Effect of B at A<sub>1</sub>, Simple Main Effect of B at A<sub>2</sub>? **A | D**
- b) Main effect of B, Simple Main Effect of B at A<sub>1</sub> **A | D**
- c) Main effect of B, Simple Main Effect of B at A<sub>2</sub> **A | D**

d) Do any of your answers for (a) to (c) above imply a significant interaction? **Y | N**

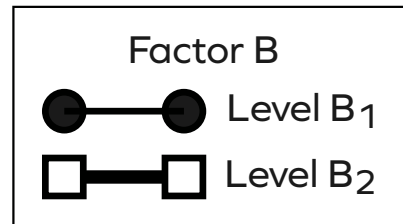
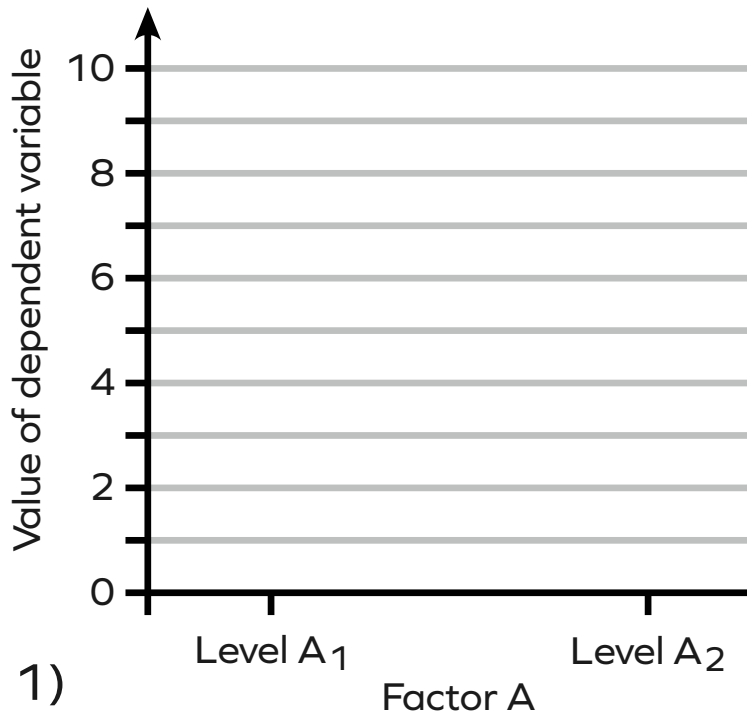




**Topic 4: Constructing Interactions**

Below are six empty graphs suitable for plotting means. Each graph represents a 2x2 factorial design. Right of each individual graph you are told which of Factor A, Factor B and the interaction should be significant.

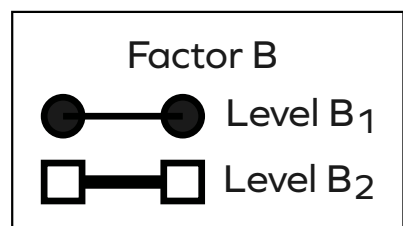
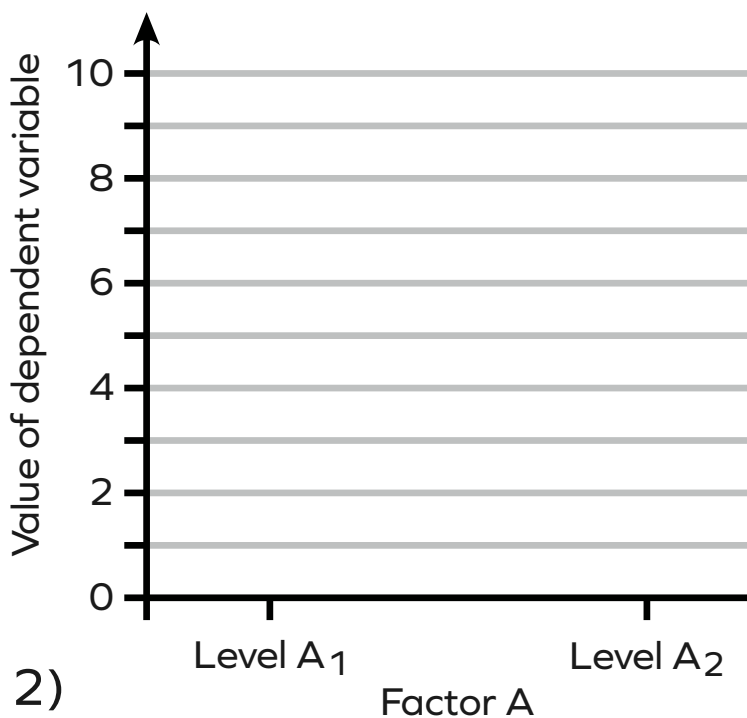
For each graph, you should plot, as clearly as possible, four cell means that will match the pattern of significances specified. Where possible, avoid using examples from the lecture and classroom exercises. *Suggestion: work in pencil.*



**Factor A:  
Significant**

**Factor B:  
Significant**

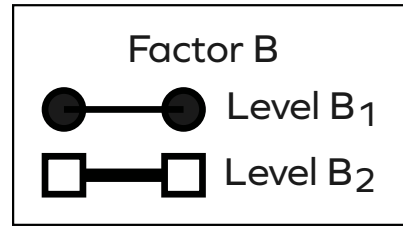
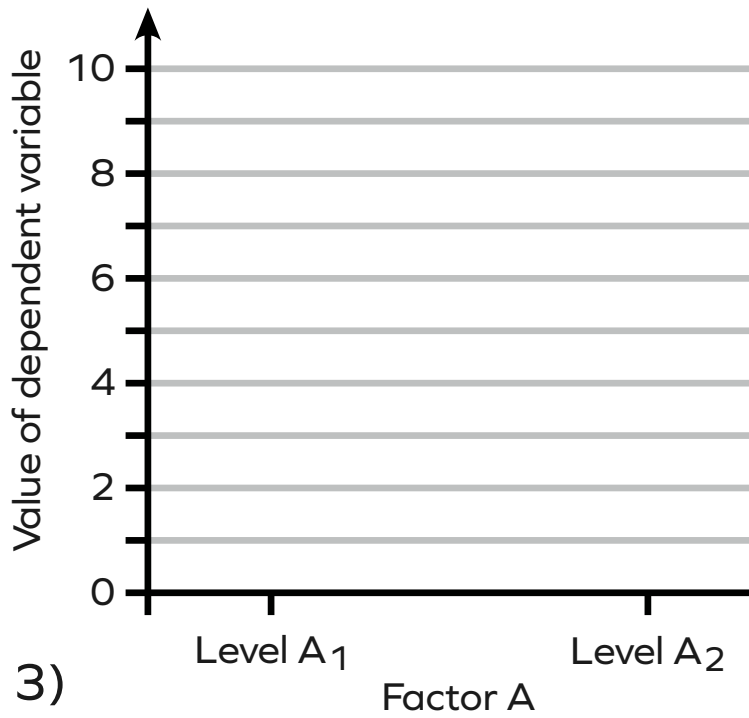
**Interaction:  
Non-significant**



**Factor A:  
Significant**

**Factor B:  
Non-significant**

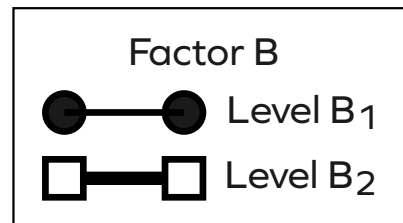
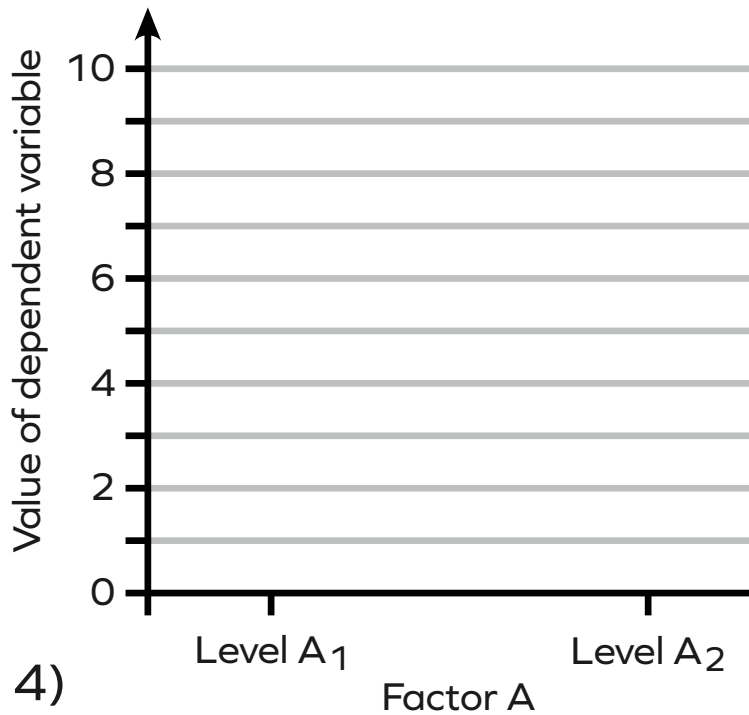
**Interaction:  
Significant**



**Factor A:**  
**Non-significant**

**Factor B:**  
**Significant**

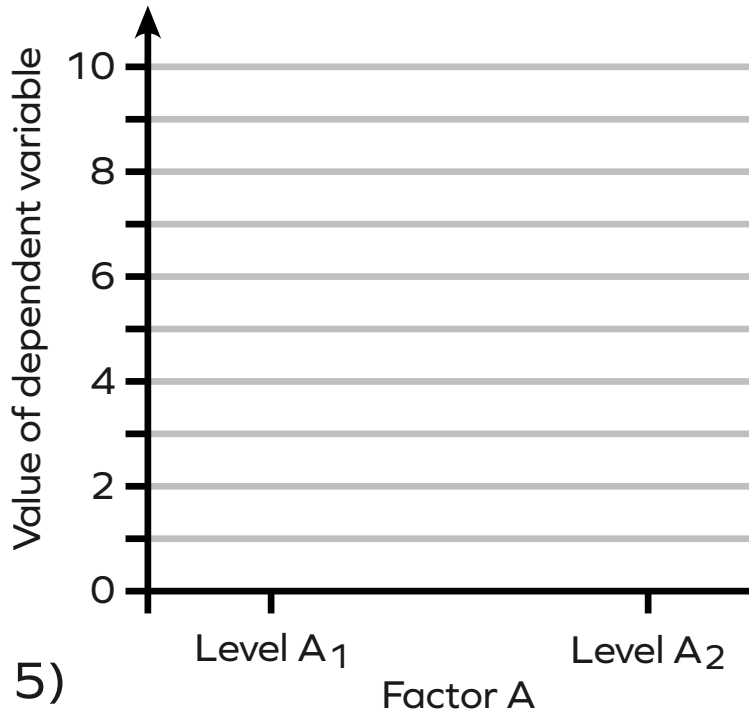
**Interaction:**  
**Significant**



**Factor A:**  
**Significant**

**Factor B:**  
**Significant**

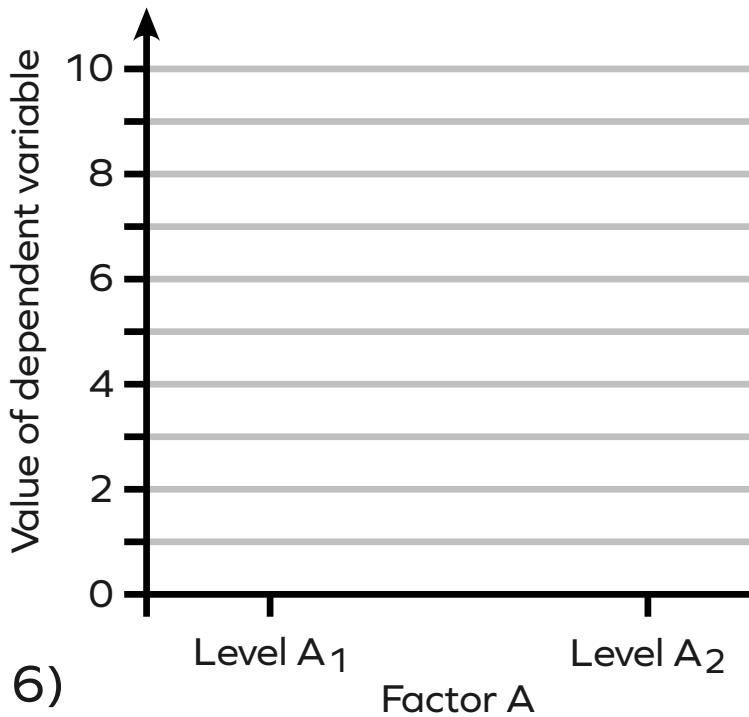
**Interaction:**  
**Significant**



**Factor A:**  
**Non-significant**

**Factor B:**  
**Non-significant**

**Interaction:**  
**Significant**



**Factor A:**  
**Significant**

**Factor B:**  
**Significant**

**Interaction:**  
**Significant**