Interpreting Interactions

Interactions

- 2-way interactions assess whether the effect of one factor depends on the level of the other factor
  - A x B: Does the effect of A depend on the level of B?
    - Does the effect of B depend on the level of A?
- 3-way interactions assess whether the interaction between 2 factors depends on the level of the 3rd factor
  - A x B x C: Does the AxB interaction depend on the level of C?
    - Does the AxC interaction depend on the level of B?
    - Does the BxC interaction depend on the level of A?

Graphical representation of 2-way interactions

- Difference between a1 & a2 depends on level of B.
- Difference between b1 & b2 depends on level of A.

Significant 2-way interactions imply a significant deviation from parallelism.

Graphical representation of 3-way interactions

- Significant AxB interaction
- Non-significant AxBxC interaction

Significant 3-way interactions imply that the deviation from parallelism in a 2-way interaction depends on the level of the 3rd factor

- Significant AxBxC interaction
- AxB interaction depends on level of C
- Significant AxB interaction in c2 but not c1
Incorrect Interpretations of Interactions

- Interaction determines if difference between 2 differences is significant
  - Is \((b_2-b_1)\) at \(a_1\) minus \((b_2-b_1)\) at \(a_2\) significantly different from zero?
- Not the same as doing separate tests of \((b_2-b_1)\) at \(a_1\) and \((b_2-b_1)\) at \(a_2\)
- Example: if t-test 1 is not significant but t-test 2 is significant, will AxB interaction be significant?
  - not necessarily…

AxB interaction is not significant & only 1 t-test is significant

AxB interaction is significant & only 1 t-test is significant

Incorrect Interpretations of Interactions

- Suppose both tests are significant… does that mean that the effect of B does not depend on A?
  - i.e., that the AxB interaction is not significant?
  - not necessarily
Incorrect Interpretations of Interactions

• Suppose that both tests are not significant... does that mean that the effect of B does not depend on A?
  • i.e., that the AxB interaction is not significant?  
    - not necessarily
AxB interaction is significant & both t-tests are not significant

Incorrect Interpretations of Interactions

- To determine if the effect of one variable depends on another
  - e.g., if the effect of one variable differs between groups or ages or genders
- ...you need to assess the interaction between the 2 variables
- should not rely on significance tests performed separately on the different groups