Research methods 04

Experimental Design II

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IVs With More Than One Level

- Thus far, we've discussed IVs as having 2 levels
  - Rx vs. control
  - Presence vs. absence
- Might be interested in different levels of an IV
  - A given IV can have multiple levels

More Than 1 IV - Factorial Designs

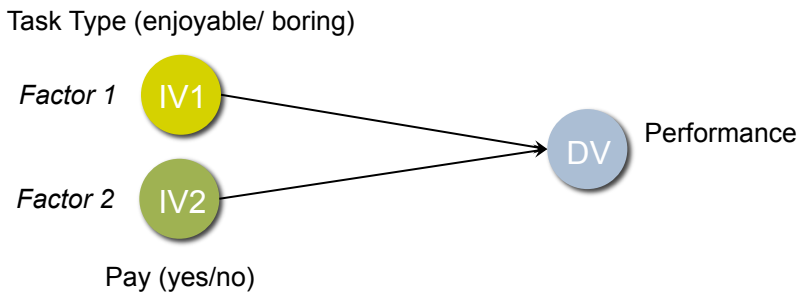
- Might be interested in how 2 IVs jointly effect a DV
- This is a factorial design
  - 2 or more IVs completely crossed
- Notation
  - 2x2 (2 IVs both with 2 levels)
  - 2x3 (2 IVs - one with 2 levels, one with 3 levels)
  - 2x2x2 (3 IVs - all with 2 levels)

Factorial Designs

- Campbell and Stanley notation
  - Let X = IV 1
  - Let Y = IV 2
  - Let O = DV

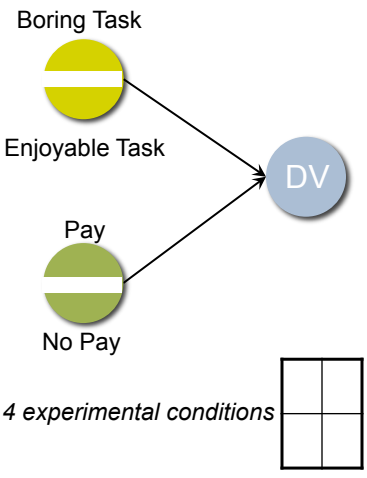
  - $R \quad X_1 \quad Y_1 \quad O_1$
    $R \quad X_2 \quad Y_1 \quad O_2$
    $R \quad X_1 \quad Y_2 \quad O_3$
    $R \quad X_2 \quad Y_2 \quad O_4$

Factorial design and interactions

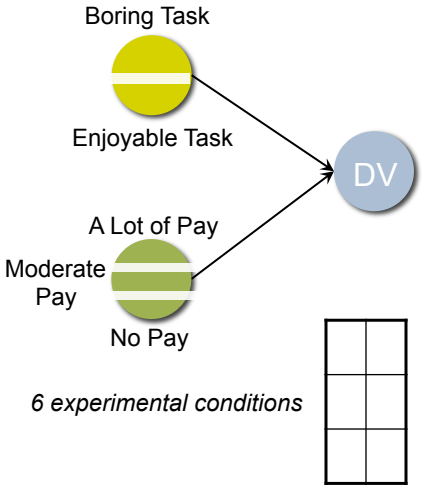


Factorial design and interactions

2 x 2 factorial design



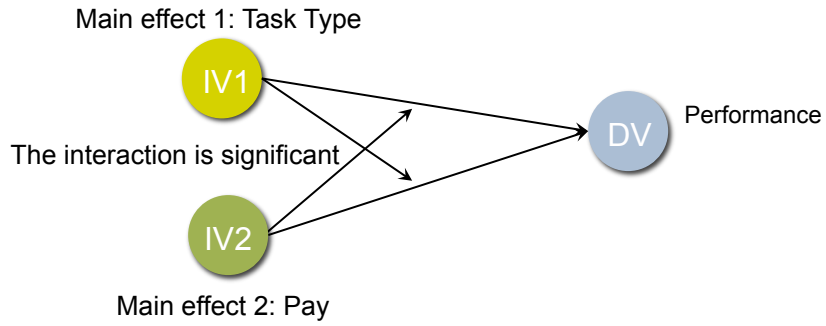
2 x 3 factorial design



Interactions and factorial design

Interaction: The effect of one IV on the DV depends on the level of another IV.

3 possible outcomes:



Interactions and factorial design

What do interactions look like for different outcomes?

Interactions : hypotheses

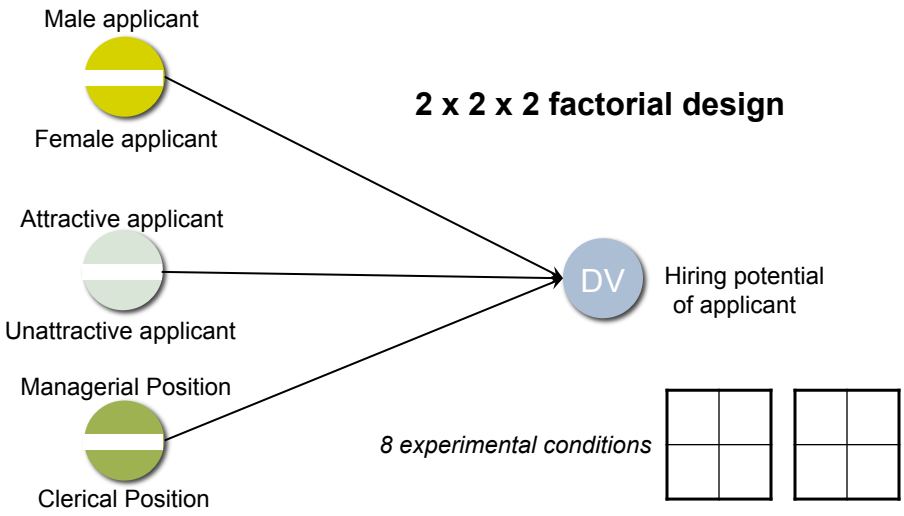
- **Hypotheses about interactions need to make explicit each experimental condition.**

Examples of hypotheses with 2-way interactions

2 factors

People who receive pay perform better than those that do not when the task they are working on is boring, whereas people who do not receive pay perform better than those who do when the task they are working on is enjoyable.

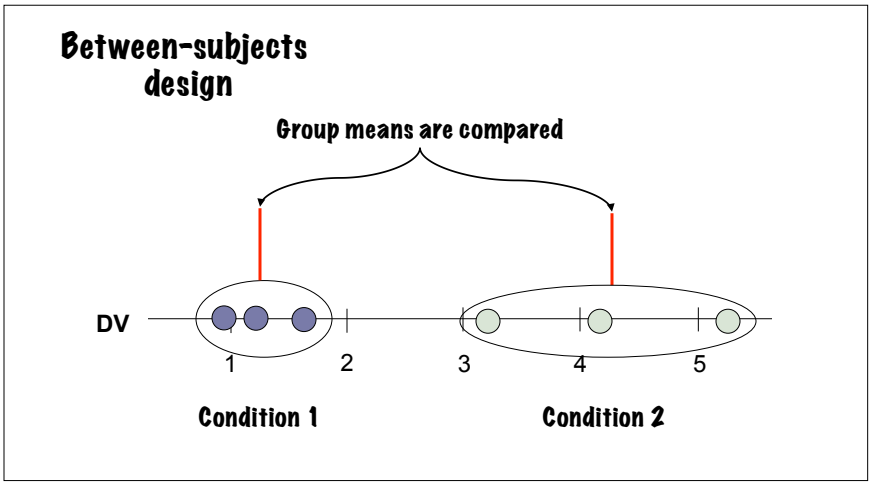
Factorial design and interactions



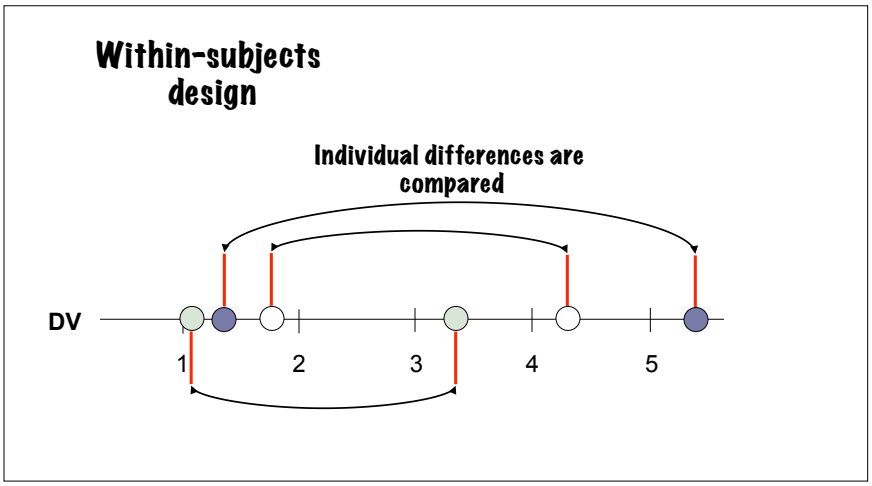
Within vs. between subjects design

- **Between-subjects design**
  - Each subject is exposed to a **single** condition
- **Within-subjects design**
  - Each subject is exposed to **all** conditions

Within vs. between subjects design



Within vs. between subjects design



Within subjects designs

Advantages

- Requires fewer subjects
  - More practical
  - Greater power
- Higher sensitivity
  - Subject serves as his or her own control
  - Reduces random error

Disadvantages

- Contamination/Order effects
  - Practice effects
  - Sensitization
  - Carry-over

Within subjects designs

- **Overcoming disadvantages:**
  - Practice effects → Counterbalance order of Rxs
  - Sensitization → Camouflage Rxs
  - Carryover→ Separate Rxs in time