

Building experiments: **Randomization**

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Outline

- Usual concerns in experimental designs (i.e., typical alternative explanations)
- How to rule these out preemptively



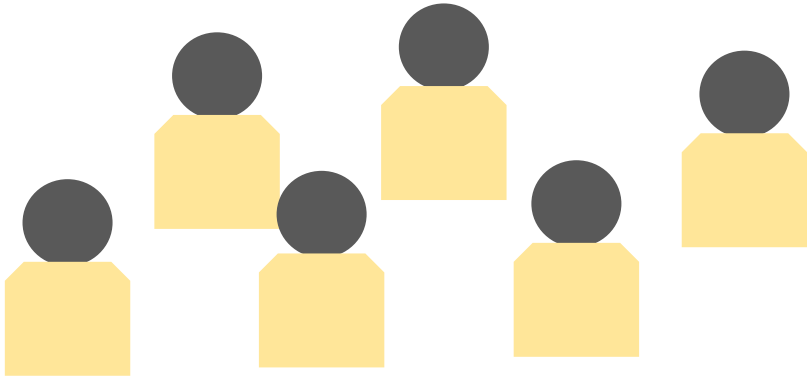
Concern 1

- Non-random allocation of participants into experimental groups (mainly for independent measures designs)
- Clustering of ability

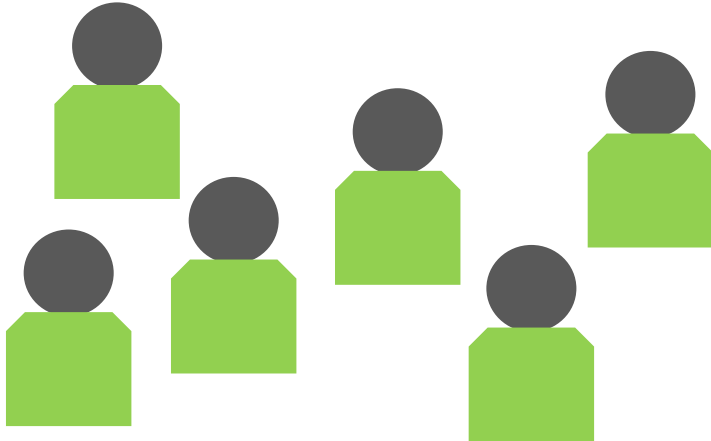


Concern 1

Group 1



Group 2



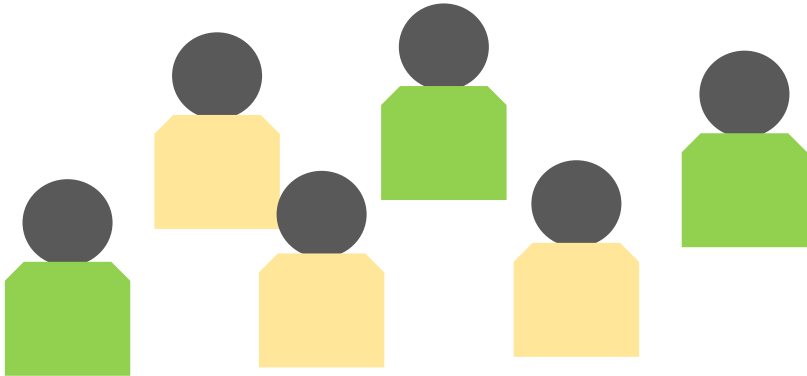
Concern 1

- Non-random allocation of participants into experimental groups (mainly for independent measures designs)
- Clustering of ability
- Solution: Random allocation of participants into experimental groups

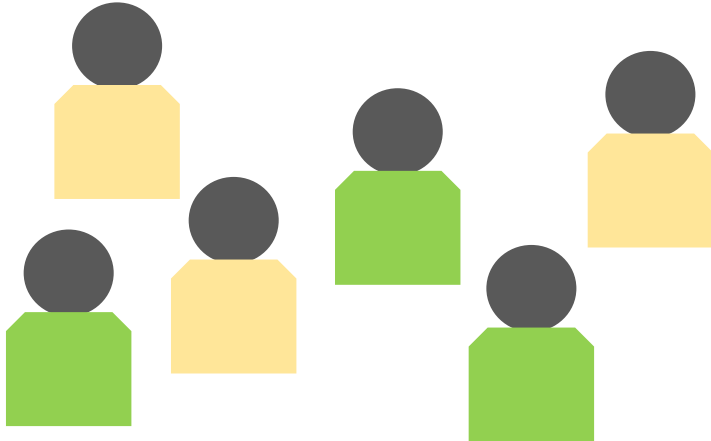


Concern 1

Group 1



Group 2



Concern 1b

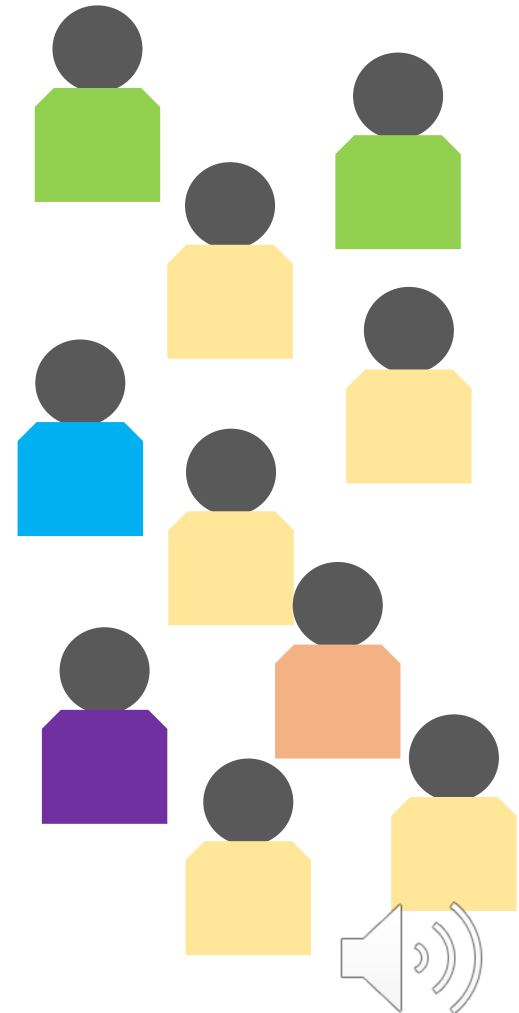
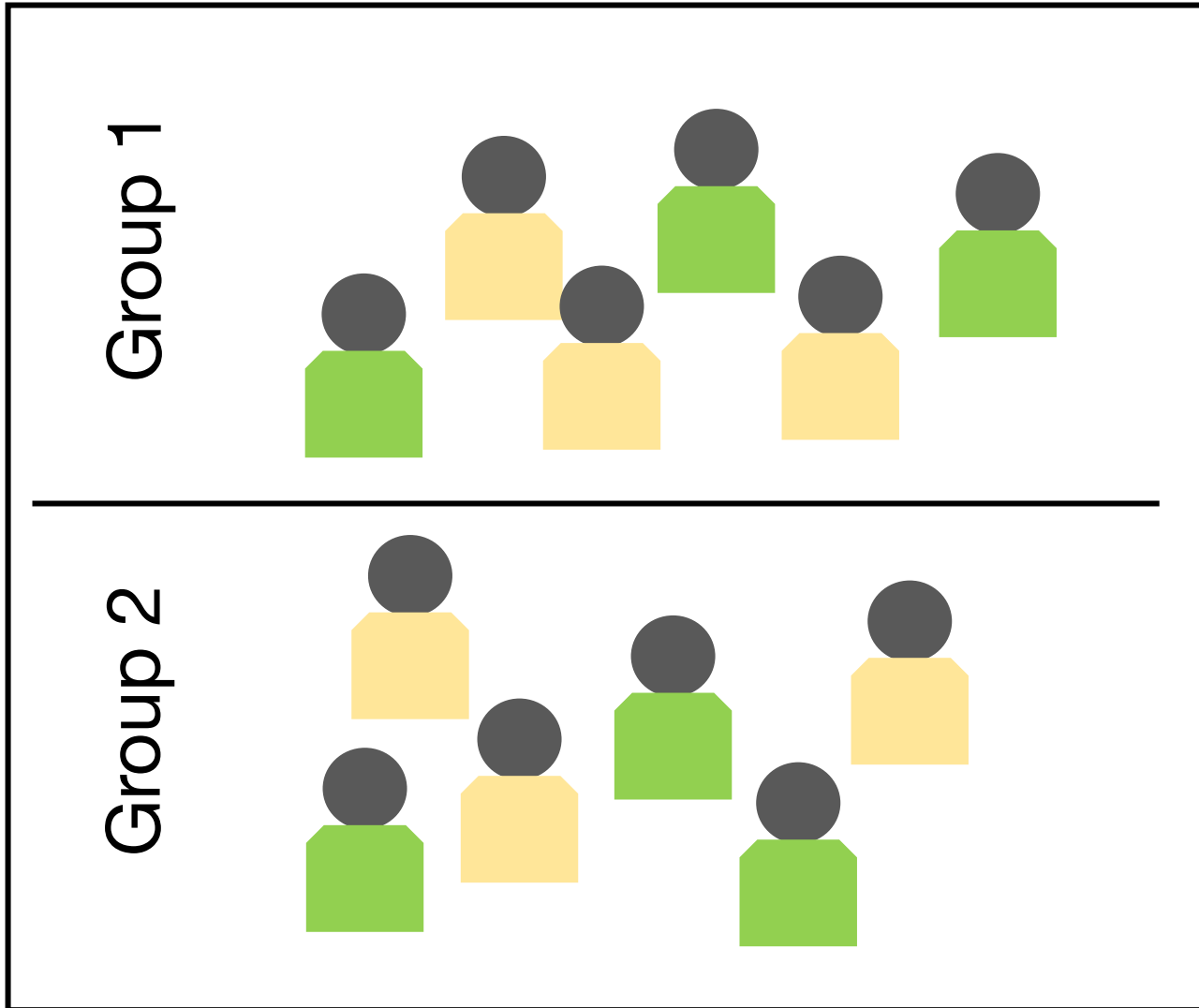
- Non-random demographic characteristics of sample
- Clustering of ability based on demographic characteristics



Concern 1b

Experiment

Real world



Concern 1b

- Non-random demographic characteristics of sample
- Clustering of ability based on demographic characteristics
- Solution: Representative sampling; Cross-cultural studies



Concern 2

- Non-random presentation of stimuli for each participant (only repeated measures)
- Potential for order effects (practice, fatigue, habituation, strategy development)



Concern 2

Participant 1

Mismatch trial:

Blue

Red

A diagram showing a participant with a yellow body and a grey head. A box above the head contains the text "Mismatch trial:" and the word "Blue" in red. A speech bubble next to the head contains the word "Red".

Match trial:

Blue

Blue

A diagram showing a participant with a yellow body and a grey head. A box above the head contains the text "Match trial:" and the word "Blue" in blue. A speech bubble next to the head contains the word "Blue".

Mismatch trial:

Blue

Green

A diagram showing a participant with a yellow body and a grey head. A box above the head contains the text "Mismatch trial:" and the word "Blue" in green. A speech bubble next to the head contains the word "Green".

...

Participant 2

Mismatch trial:

Blue

Red

A diagram showing a participant with a blue body and a grey head. A box above the head contains the text "Mismatch trial:" and the word "Blue" in red. A speech bubble next to the head contains the word "Red".

Match trial:

Blue

Blue

A diagram showing a participant with a blue body and a grey head. A box above the head contains the text "Match trial:" and the word "Blue" in blue. A speech bubble next to the head contains the word "Blue".

Mismatch trial:

Blue

Green

A diagram showing a participant with a blue body and a grey head. A box above the head contains the text "Mismatch trial:" and the word "Blue" in green. A speech bubble next to the head contains the word "Green".

...



Concern 2

- Non-random presentation of stimuli for each participant (only repeated measures)
- Potential for order effects (practice, fatigue, habituation, strategy development)
- Solution: Randomisation of stimuli for each participant (i.e., counterbalancing)



Concern 2

Participant 1

Mismatch trial:

Blue

Red

A diagram showing a participant with a yellow body and a grey head. A box above the head contains the text "Mismatch trial:" and the word "Blue" in red. A speech bubble next to the head contains the word "Red".

Match trial:

Blue

Blue

A diagram showing a participant with a yellow body and a grey head. A box above the head contains the text "Match trial:" and the word "Blue" in blue. A speech bubble next to the head contains the word "Blue".

Mismatch trial:

Blue

Green

A diagram showing a participant with a yellow body and a grey head. A box above the head contains the text "Mismatch trial:" and the word "Blue" in green. A speech bubble next to the head contains the word "Green".

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Participant 2

Mismatch trial:

Blue

Green

A diagram showing a participant with a blue body and a grey head. A box above the head contains the text "Mismatch trial:" and the word "Blue" in green. A speech bubble next to the head contains the word "Green".

Mismatch trial:

Blue

Red

A diagram showing a participant with a blue body and a grey head. A box above the head contains the text "Mismatch trial:" and the word "Blue" in red. A speech bubble next to the head contains the word "Red".

Match trial:

Blue

Blue

A diagram showing a participant with a blue body and a grey head. A box above the head contains the text "Match trial:" and the word "Blue" in blue. A speech bubble next to the head contains the word "Blue".

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Summary

- Frequent alternative explanations
 - Clustering of ability or demographic characteristics
 - Order effects
- How to design experiments to preemptively rule them out
 - Randomly allocating participants to conditions
 - Randomly allocating stimuli to participants

