A Three-Step Approach to Tetrad and Triangle Comparisons

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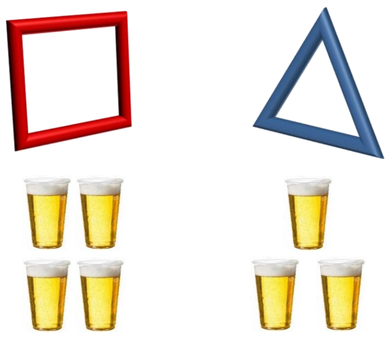
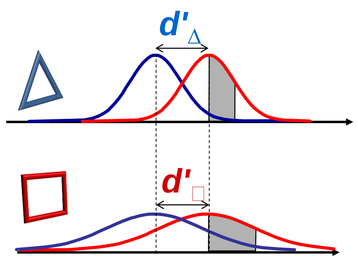
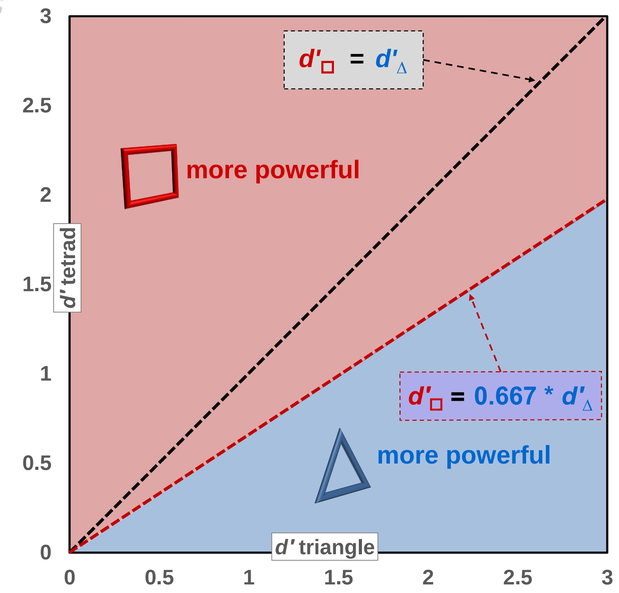


Introduction



- Tetrad theoretically more powerful than triangle
- But, 4 samples vs. 3 → Additional experimental noise (memory, sensory fatigue) → Reduction of tetrad's power advantage
- Companies should research with own products and panelists
- Experimental approach: Performance compared using pairs of samples evaluated with both methods
- Careful sample selection essential to avoid
  - Underpower (no discrimination)
  - Overpower (clear discrimination)
- Three-step process maximizes likelihood of successful investigation
- Approach described here with malt-based beverages



Step 1 Product Types and Spiking

- Four product types varying in expected levels of sensory fatigue
  - Shandy
  - IPA
  - Light lager
  - Spiked sparkling water

- Within each product type, four added flavor levels
  - 0, N_1, N_2, N_3
  - Informal testing

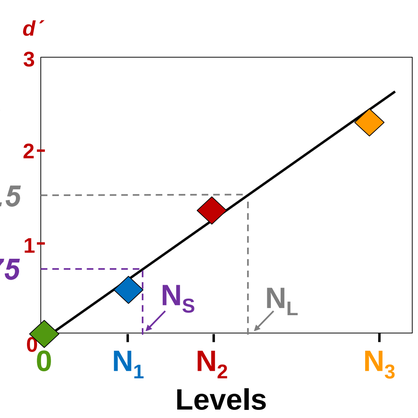
Step 2 Torgerson's Method of Triads

- Within each product type
- Instructions: "Which of the two samples is more similar to the reference?"
- 12 possible triads
- Each triad evaluated – approximately – 10 times
- Data analyzed using IFPrograms® 9.0.4

For each product type Torgerson's method outcomes

Larger target difference d'=1.5

Smaller target difference d'=0.75

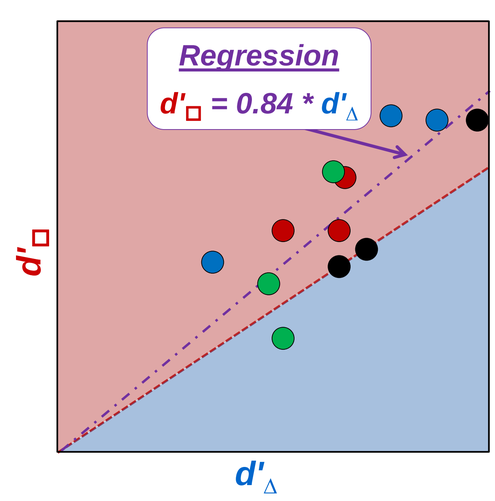


Tetrad vs. Triangle	Levels
X	0
Y	N_S
Z	N_L

Step 3 Tetrad vs. Triangle Investigation

Tetrad vs. Triangle Comparisons	# Trials
X vs. Y	~ 50
X vs. Z	~ 50
Y vs. Z	~ 50

Results combined (3 data points per product type)



- For each product type and sample pair, *d'* values estimated (IFPrograms® 9.0.4)
- Overall, tetrad confirmed to be more powerful than triangle for all product types
- *d'□ vs. d'△*
  - Additional noise measured with the tetrad (regression coefficient, 0.84 < 1)
  - Not enough to cancel out the tetrad greater power (regression coefficient, 0.84 > 0.667)
- Power calculations: Panel's size with tetrad can be reduced by approximately 40% without loss of power compared to current risk profile involving triangle testing

Conclusions

- Three-step approach successful at selecting sample pairs for tetrad vs. triangle comparison
  - Avoided under- and over-powered comparisons that would have resulted in inconclusive outcomes and a waste of company time and resources
- Experimental approach recommended for any investigational research involving the performance comparison of sensory and consumer testing methodologies

References

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