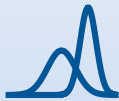




How do Perceived Sensory Differences and Preferences Relate?



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The Need for Information on Consumer Relevance



- Essential fact:
 - When comparing two products for similarity
 - Assuming that the sample size is large enough
 - **A statistically significant result will always be found**
- What is the optimal sample size?

12? 20? 100? 1,000?

- An optimal sample size can only be set if **the size of the relevant difference** is known



Type I error



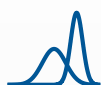
Type II error
(Power = 1-β)



Size of the
difference



Sample
size



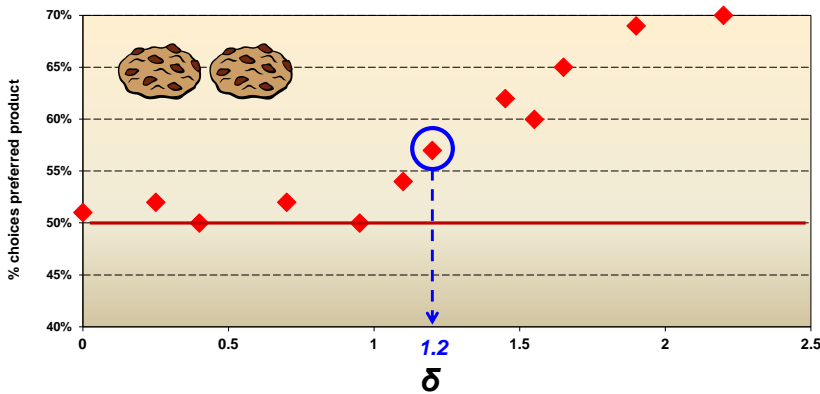
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How Can We Set δ_R ?

Option 1: Using a Relationship between Sensory Difference and Consumer's Preference

Not real data - Illustrative example



- δ is a standardized measure of sensory difference
- d' is the experimental estimate of δ



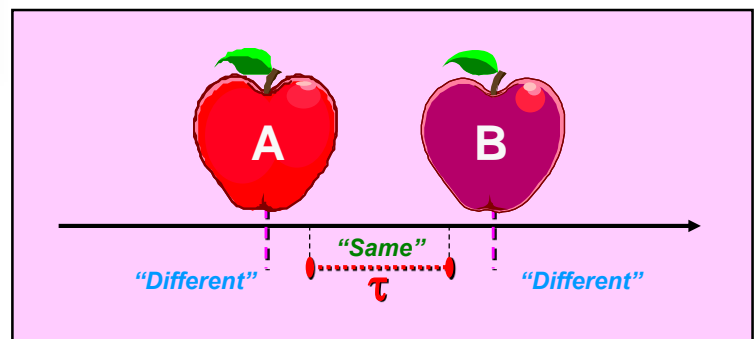
- The relevant threshold can be set at $\delta_R=1.2$
 - Using this value, the program's risk profile can be established
 - Triangle test
 - $\alpha=5\%$
 - Power=80%
 - $\delta_R=1.2$
- N=116

Option 2: Using the Same-Different Method



Are the two apples the same or different?

"Different"



Using the Same-Different Method (Cont.)

Not real data - Illustrative example



Pair	"D"/S	"S"/S	"D"/D	"S"/D	d'	τ
A vs. B	85	65	90	60	0.60	0.81
C vs. D	87	63	89	61	0.38	0.78
A vs. C	86	64	104	46	1.21	0.80
B vs. D	87	63	99	51	0.97	0.78
A vs. D	84	66	111	39	1.54	0.82
B vs. C	86	64	92	58	0.66	0.80

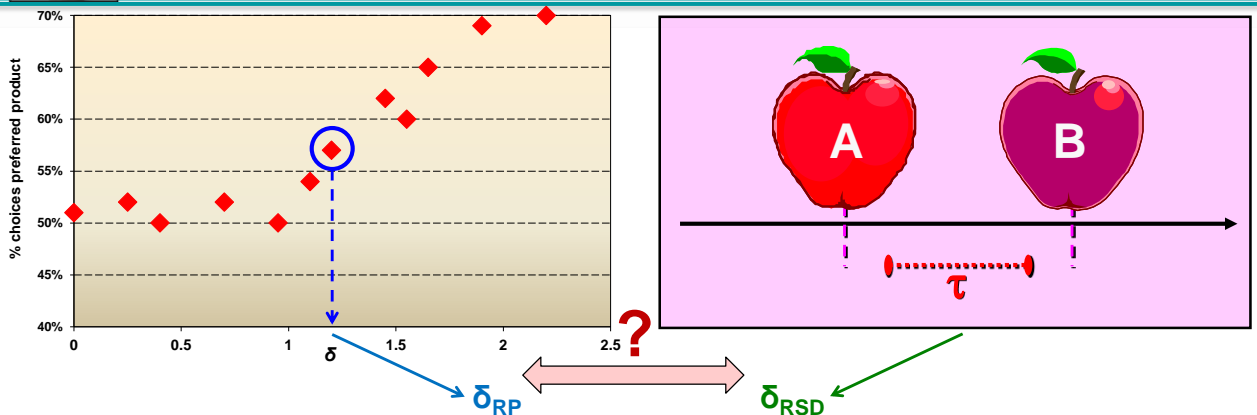
Average 0.80



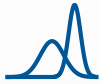
- ❖ 0.80 corresponds to the consumer threshold for "difference"
 - ❖ The program's risk profile can then be established
 - ❖ Tetrad test
 - ❖ $\alpha=5\%$
 - ❖ Power=80%
 - ❖ $\delta_R=0.80$
- N=140



Question: How do Difference and Preference Relate?



- Do the preference and the same-different approaches lead to different predictions?
- If yes, which is more relevant, if either?

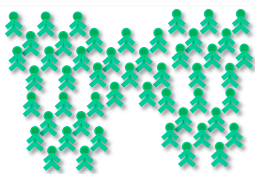


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and Preferences Relate?



Study Design

Subjects and Stimuli



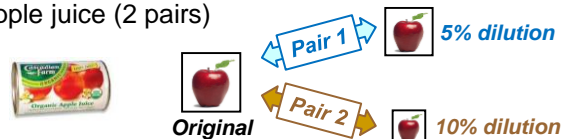
- 256 consumers
 - 126M, 130F
 - Average age 24.8 years old

• Stimuli

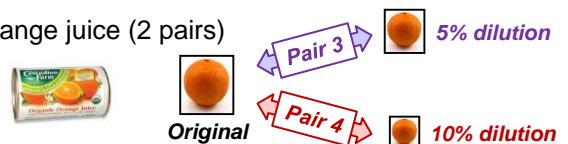
- Fruit juices varying in concentration



- Apple juice (2 pairs)



- Orange juice (2 pairs)



Degree of Difference: τ Criteria

Are the two apples the same or different and are you sure or not sure?

"Different not sure"

"Same !"

"Same ?"

"Diff. ?"

"Diff. !"

Procedures

- Each consumer performed



- Instructions

Preference

DOD

Pair 1

or

Pair 2

Same

Different

and

Pair 3

or

Pair 4

Same

Different

Preference



DOD



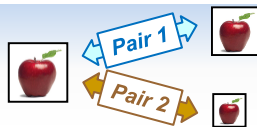
Sample size	Pair 1	Pair 2	Pair 3	Pair 4
Preference	128	128	128	128
DOD	128	128	128	128



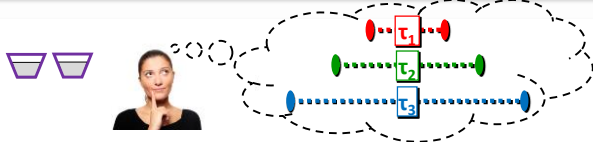
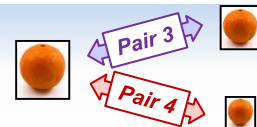
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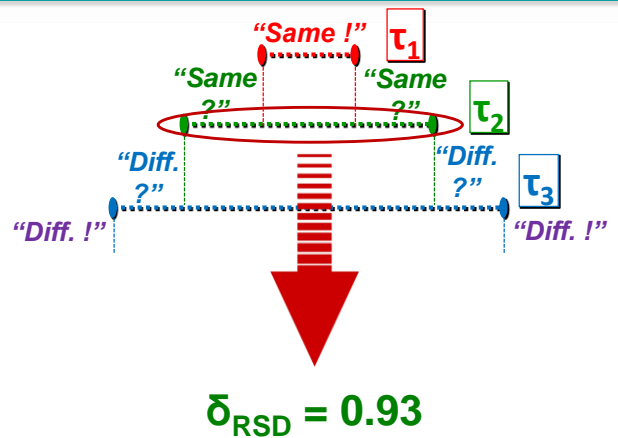
Results

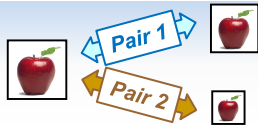


Degree of Difference Results

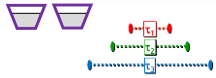
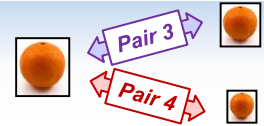


Pair	d'	τ_1	τ_2	τ_3
Pair 1	0.95	0.4	0.8	1.3
Pair 2	1.41	0.7	1.1	1.5
Pair 3	0	0.6	0.9	1.3
Pair 4	1.14	0.5	0.9	1.5
Average		0.55	0.93	1.40

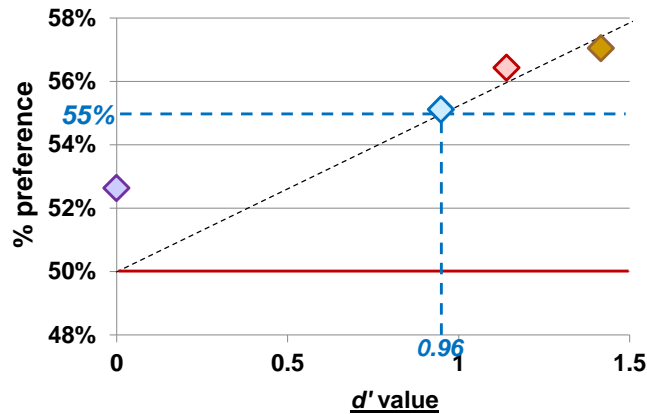




Preference Test Results



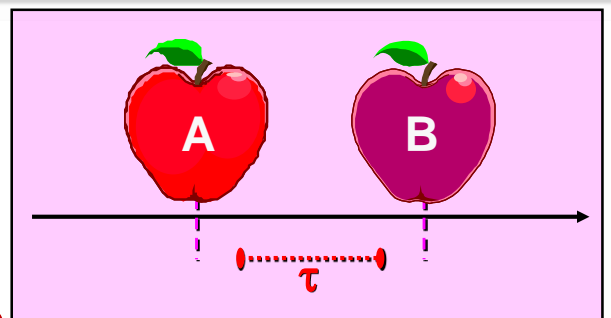
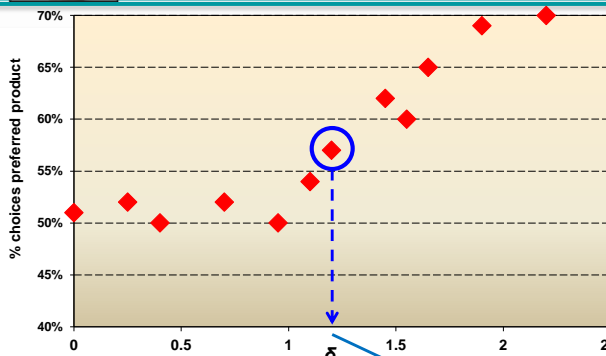
Pair	DOD	Pref.
Pair 1	0.95	55.1%
Pair 2	1.41	57.0%
Pair 3	0	52.3%
Pair 4	1.14	56.3%



$$\delta_{RP} = 0.96$$



Question: How do Difference and Preference Relate?



$$\delta_{RP} = 0.96$$

$$\delta_{RSD} = 0.93$$

- The two approaches lead to the same prediction



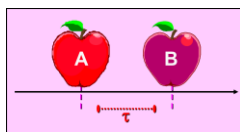
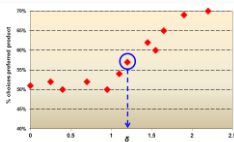
How do Perceived Sensory Differences and Preferences Relate?



Conclusions



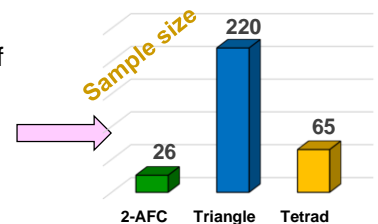
Question: How do Difference and Preference Relate?



- The preference and same-different approaches lead to similar predictions
- When consumers perceive a difference that, in their mind, is no longer negligible, they will begin preferring one sample over the other
- Interestingly, both methods point to a consumer relevant threshold of $\delta_R = 1.0$

- This value can be used to determine the sample size needed to ensure decision reliability in a sensory discrimination program

- For instance, if
 - ❖ $\alpha=5\%$
 - ❖ **Power**=80%
 - ❖ $\delta_R=1.0$

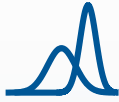


- Further research is needed to confirm these results and the stability of δ_R across products and consumer populations



SenseAsia 2016

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Thank You For Your Attention **Any Questions?**