

| 10th Pangborn Sensory Science Symposium |



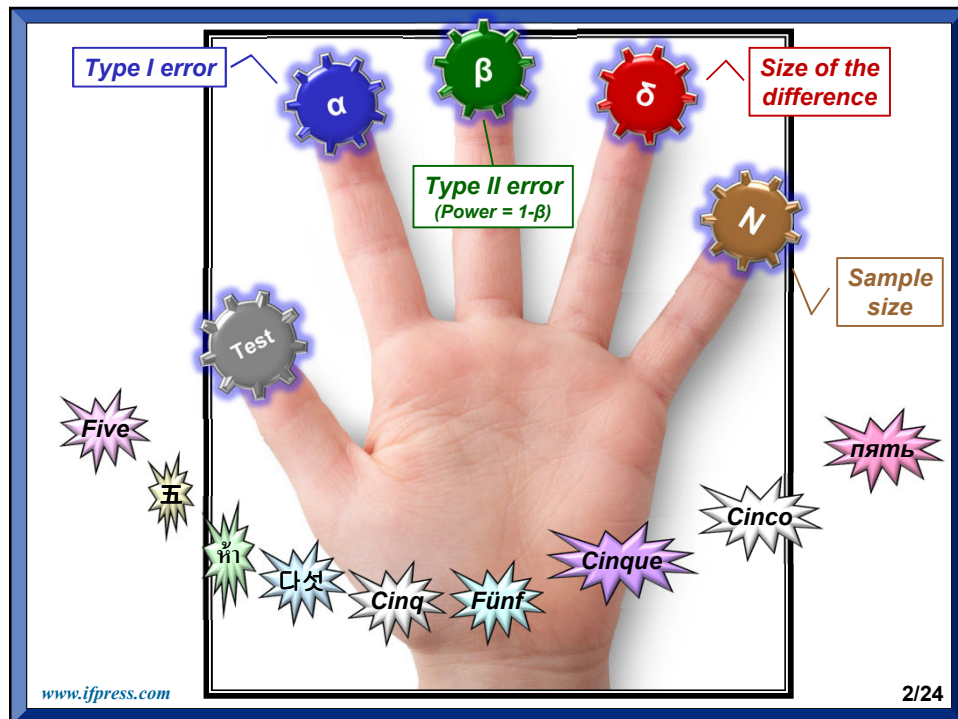
11 – 15 August 2013
Windsor Barra Hotel, Rio de Janeiro, Brazil

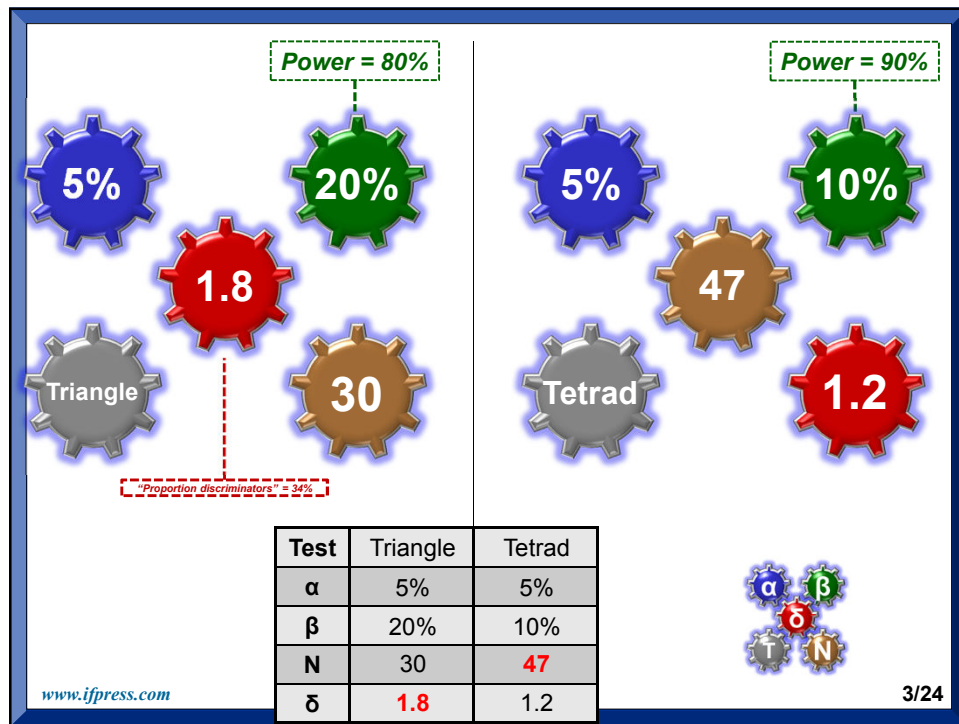
Why establishing the consumer relevance of a sensory difference is critical

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Why establishing the consumer relevance of a sensory difference is critical

First Investigation

Improving the Power of the Triangle Test with The Tetrad Protocol






Research Background

Which one is different?

- The triangle test is the most commonly used discrimination testing methodology
 - ❖ Easy to execute
 - ❖ No need to specify an attribute



However...

- ❖ It lacks statistical power
- ❖ The 2-Alternative Forced Choice is more powerful
 - However, an attribute must be specified



Which one is more bitter?



- Ennis, D. M. (1993). The power of sensory discrimination methods. *JSS*, **8**, 353-370
- Ennis, J. M. and Jesionka, V. (2011). The power of sensory discrimination methods revisited. *JSS*, **26**, 371-382

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Research Background (Cont.)

Make 2 groups of 2 samples based on similarity

- The tetrad test has recently received a lot of attention
 - ❖ Theoretically more powerful than the triangle test
 - ❖ Does not require the specification of an attribute
- Power confirmed experimentally under certain conditions
 - ❖ Masuoka, Hatjopoulos and O'Mahony, 1995
 - ❖ Delwiche and O'Mahony, 1996
 - ❖ Garcia, Ennis and Prinyawiwatkul, 2012



- However further work is needed
 - ❖ For small sensory differences ($\delta < 1$)
 - ❖ In potentially more fatiguing conditions (retasting vs. no retasting)

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First Investigation

*Improving the Power of the Triangle Test
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Study Design



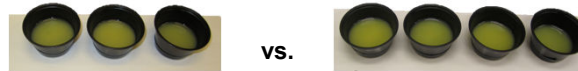
Subjects and Stimuli







- 456 consumers
 - ❖ 200 M, 256 F; average age 24.4 yrs.
- Stimuli
 - ❖ Fruit juices varying in concentration
 - ❖ Apple juice
 - Full strength vs. 10% dilution
 - ❖ Orange juice
 - Full strength vs. 20% dilution



Procedures



- Triangle and tetrad compared under four conditions

Apple		Orange	
No retasting	Retasting	No retasting	Retasting
			

- Amounts served

❖ No retasting: 10 mL

❖ Retasting: 20 mL

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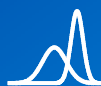


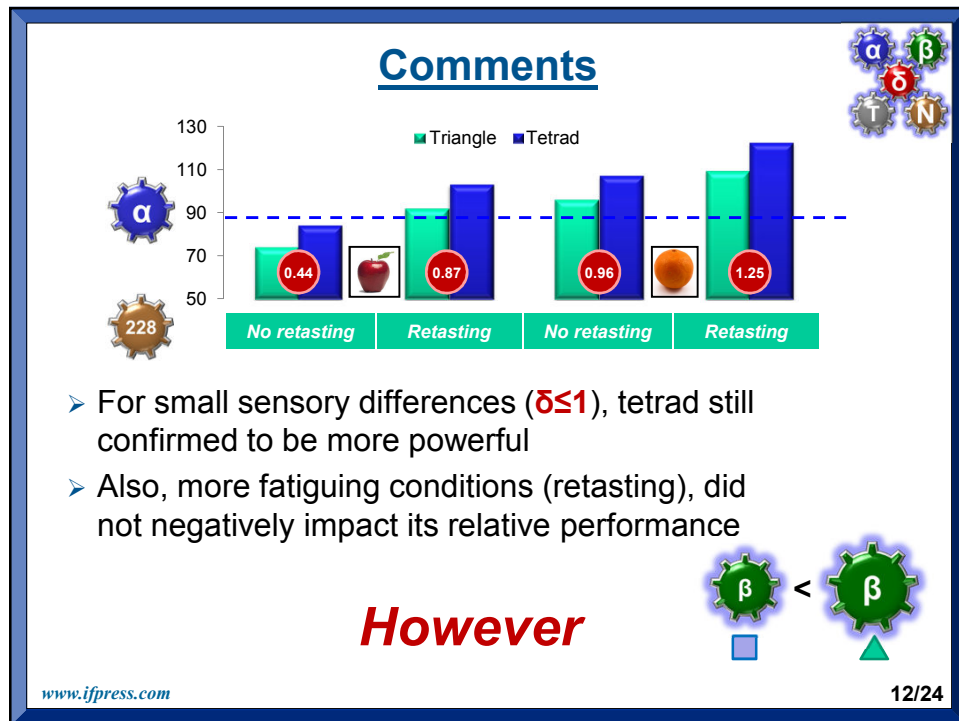
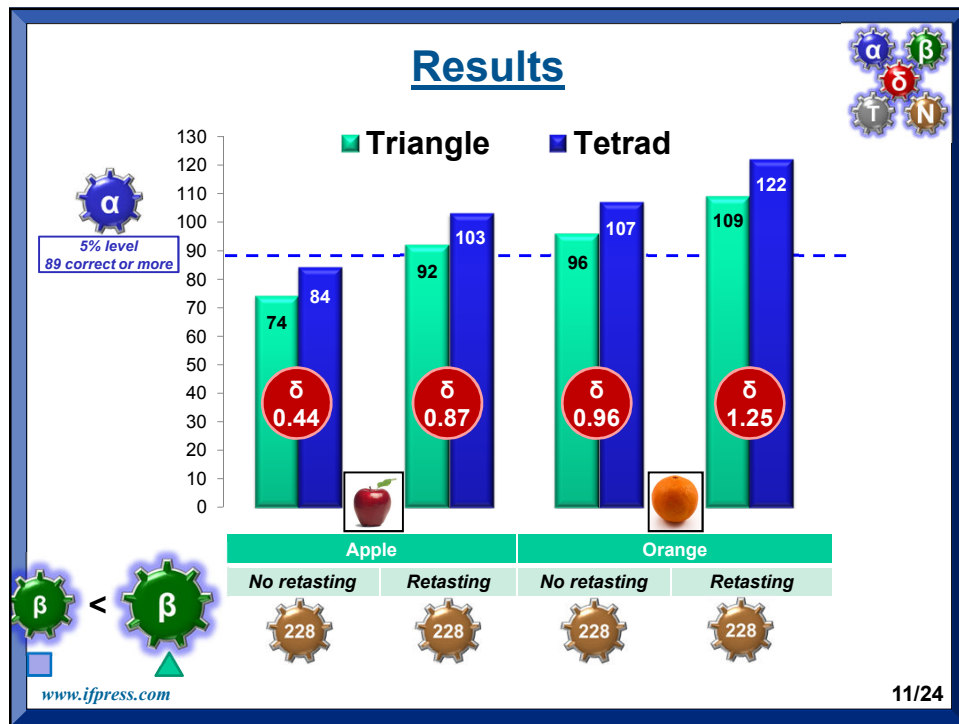
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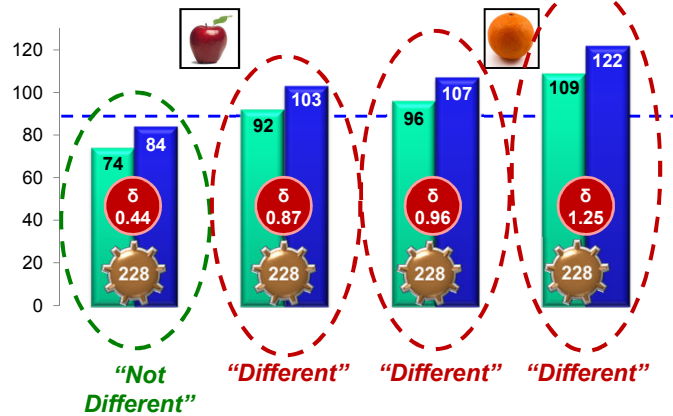
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Results





Comments (cont.)



- Do the results from the apple no retasting condition mean that consumers could not discriminate between the samples?
- Does it mean that the difference is not relevant?

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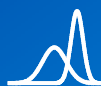
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Why establishing the consumer relevance of a sensory difference is critical

Second Investigation

Studying the Relevance of the Size of the Sensory Difference



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Second Investigation
*Studying the Relevance
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Study Design



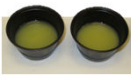
Subjects and Stimuli

- 208 consumers
 - ❖ 94M, 114F; average age 27.2 yrs.
- Stimuli
 - ❖ Fruit juices varying in concentration
 - ❖ Apple juice
 - Full strength vs. 10% dilution
 - ❖ Orange juice
 - Full strength vs. 20% dilution











Procedures



Which sample do you prefer, or do you have no preference?

➤ Preference test under the same conditions



 Apple		 Orange	
No retasting	Retasting	No retasting	Retasting
 N	 104	 104	 104

➤ Amounts served

- ❖ No retasting: 10 mL
- ❖ Retasting: 20 mL

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




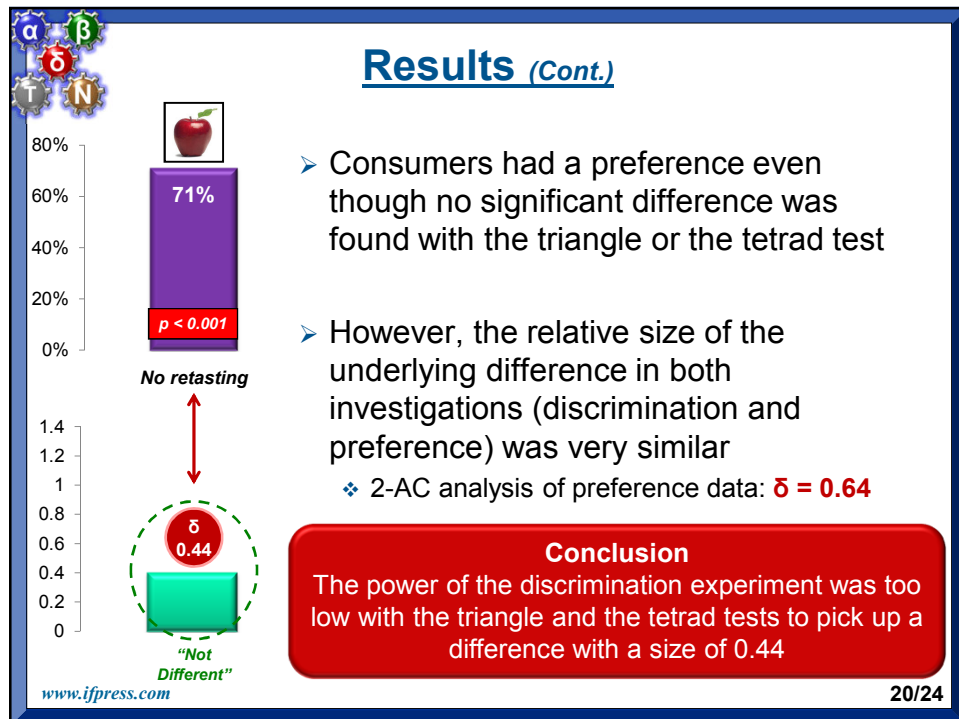
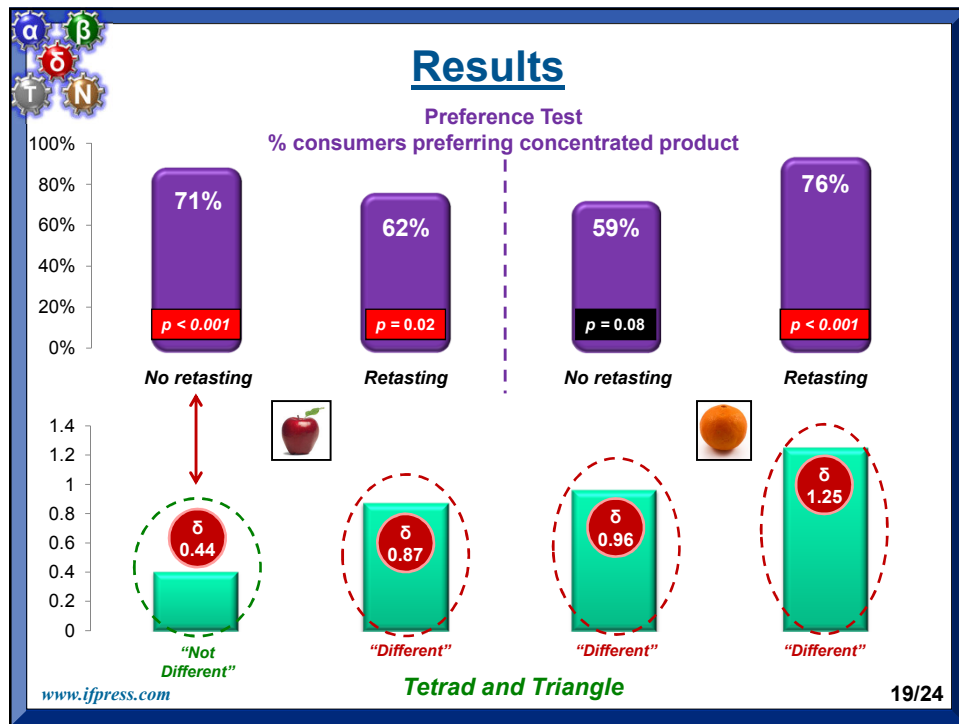
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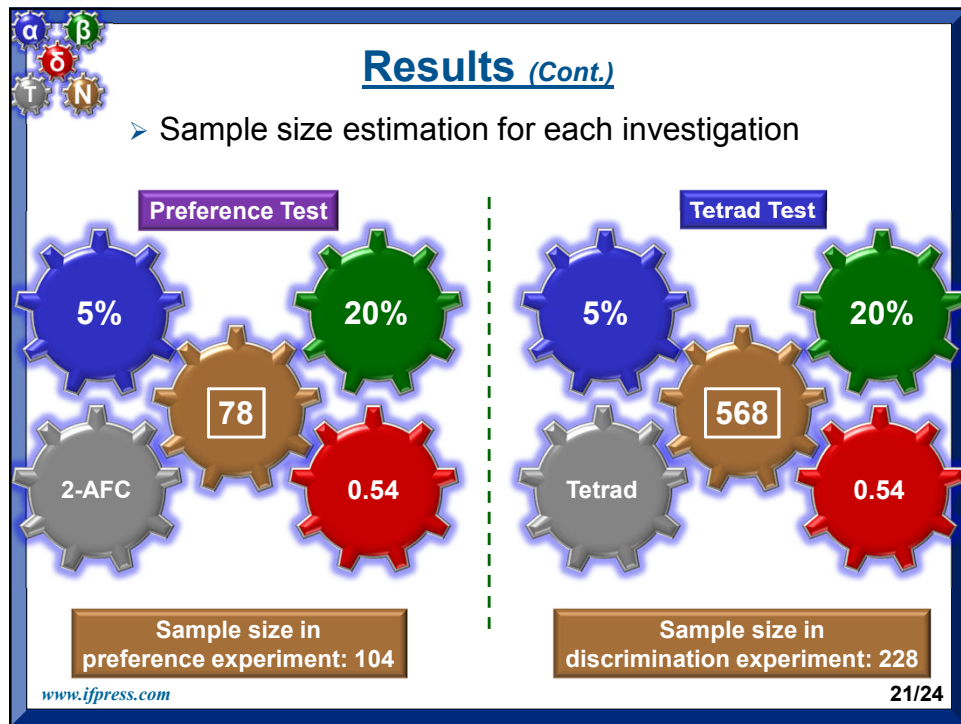
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Results





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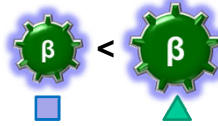
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Conclusions



Conclusions

- The tetrad test's superiority over the triangle test was confirmed for small sensory differences and conditions with potentially added sensory fatigue



However

- Just using a more powerful test is not sufficient
 - ❖ The experiment must be powerful enough!
- For this, it is essential to estimate the size of the relevant sensory difference, δ
 - ❖ Can be done using preference tests, a same-different protocol, through building the relationship between experts and consumers, ...
- Without it, information will be missing to provide enough confidence that the difference between two products is 'small enough' when no significant difference is found

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Type I error

Type II error
(Power = $1 - \beta$)

Size of the difference

Sample size

Test

α

β

δ

N

Thank You

Any Questions?

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