



# **FDE443 SENSORY ANALYSIS**

## **Lesson-10**

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# TESTS IN SENSORY ANALYSIS (Difference Tests)

**Does a sensory difference  
exist between samples?**

# TESTS IN SENSORY ANALYSIS

- ✓ There are many types of sensory analysis methods, the most popular being;
  - ✓ Difference tests
  - ✓ Descriptive analysis
  - ✓ Consumer acceptance testing



# TESTS IN SENSORY ANALYSIS

✓ Purpose: to decide the right test for a given situation

Question	Method
Are the products different?	Difference tests
If the products are different, what is the magnitude of difference?	Descriptive Analyses
What is the acceptability of the product? Is one product preferred over another one?	Hedonic tests Affective tests – Acceptability tests; Preference tests

# Area of Application of Difference Tests: Does a Sensory Difference Exist Between Samples?

The tests are suitable for applications such as:

1. To determine whether product differences result from a change in ingredients, processing, packaging or storage
2. To determine whether an overall difference exists, where no specific attribute(s) can be identified as having been affected
3. To determine whether two samples are sufficiently similar to be used interchangeably
4. To select and train panelists and to monitor their ability to discriminate between test samples

# Difference/Discrimination Tests

## ✓ Advantage

- Quick and simple

## ✓ Limitations

- Limited results – only yes they are different or no they are not
- Difference tests estimate the *magnitude* of sensory differences between samples, but one limitation of these tests is that *the nature of the differences is not defined*

# Difference/Discrimination Tests

- ✓ A combination of difference tests and descriptive sensory analysis can be used for problem-solving
- ✓ The most commonly used difference tests are
  - ✓ Triangle test
  - ✓ Duo-trio tests
- ✓ Other common difference tests are paired-comparison test, two-out-of-five test, A, Not-A test

# Difference/Discrimination Tests

- ✓ Overall difference tests
- ✓ Attribute difference tests



# Difference Tests

## *Overall difference tests:*

- ✓ Does a sensory difference exist between samples?
  - ✓ Tests that can detect any difference at all between samples.

## *Attribute difference tests:*

- ✓ How does attribute X differ between samples?
- ✓ Subjects are asked to concentrate on a single attribute (or a few attributes)
  - e.g., “Please rank these samples according to sweetness.” All other attributes are ignored.

# Difference Tests-Triangle Test

- ✓ Use this method when the test objective is to determine whether a sensory difference exists between two products.
- ✓ Situations where treatment effects may have produced product changes, which cannot be characterized simply by one or two attributes.
- ✓ It is statistically more efficient than duo-trio test.

# Difference Tests-Triangle Test

- ✓ The Triangle is effective in certain situations:
  1. To determine whether product differences result from a change in ingredients, processing, packaging, or storage
  2. To determine whether an overall difference exists, where no specific attribute(s) can be identified as having been affected
  3. To select and monitor panelists for ability to discriminate given differences

# Difference Tests-Triangle Test

## *PRINCIPLE OF THE TEST*

- ✓ Present to each subject three coded samples. Instruct subjects that two samples are identical and one is different (or odd).
- ✓ Ask the subjects to taste (feel, examine) each product from left to right and select the odd sample.
- ✓ Count the number of correct replies and refer to Table specific to this test for interpretation.

# Difference Tests-Triangle Test

## *TEST SUBJECTS*

- ✓ Generally, 20 to 40 subjects are used for Triangle tests, although as few as 12 may be employed when differences are large and easy to spot.
- ✓ Similarity testing, on the other hand, requires 50 to 100 subjects.

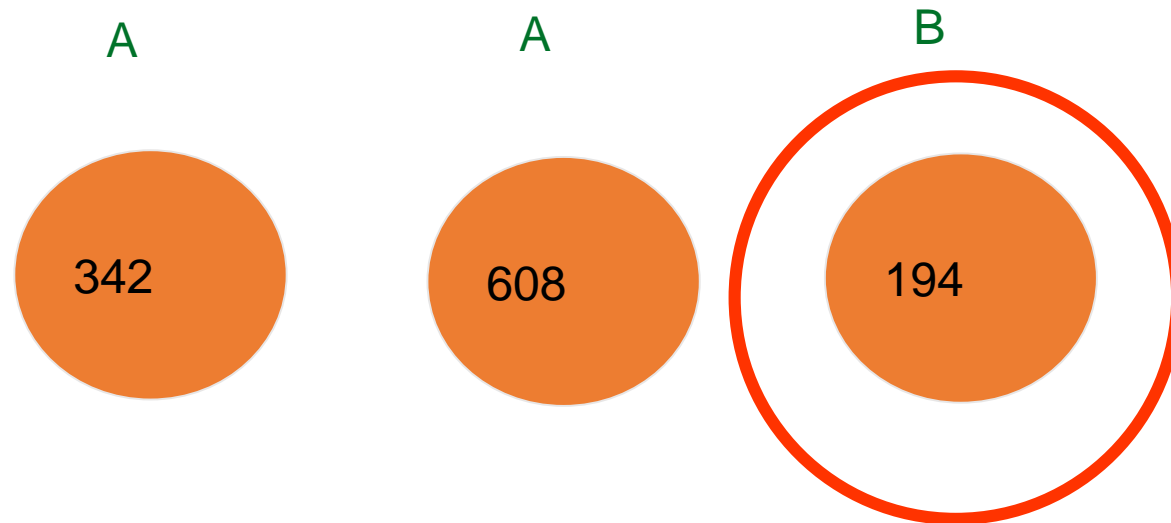
# Difference Tests-Triangle Test

## *TEST SUBJECTS*

- ✓ As a minimum, subjects should be familiar with;
  - ✓ the Triangle test (the format, the task, the procedure for evaluation), and
  - ✓ the product being tested, especially because flavor memory plays a part in triangle testing.
- ✓ An orientation session is recommended

# Difference Tests-Triangle Test

✓ *Triangle Test: Choose the sample that is most different*



# Difference Tests-Triangle Test

Sample **A**: classic döner

Sample **B**: marinated döner

✓ 6 possible combinations should be presented an equal number of times (ABB, BAA, AAB, BBA, ABA ve BAB) and randomly.

Tray	<b>ABA</b>
1	□○*

Tray	<b>AAB</b>
2	□○*

Tray	<b>BBA</b>
3	□○*

Tray	<b>BAB</b>
4	□○*

Tray	<b>ABB</b>
5	□○*

Tray	<b>BAA</b>
6	□○*



# Difference Tests-Triangle Test

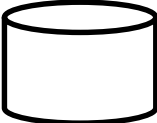
➤ *Randomized 3-digit sample codes:*

**Example :**

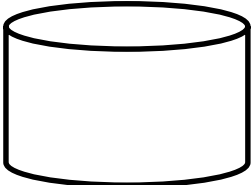
- 667 – Classic Chicken Döner
- 189 - Classic Chicken Döner
- 312 – Marinated Chicken Döner
- 570 - Marinated Chicken Döner

# Difference Tests-Triangle Test

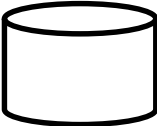
## Presentation of Samples



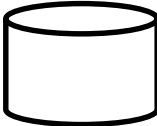
Water



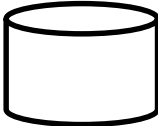
Cup for expectoration



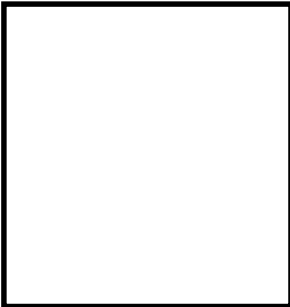
189



312



570



Score sheet

# Difference Tests-Triangle Test



An different  
example:  
Triangle test for  
primary school  
students:

Is there a difference  
between low-fat and  
regular fat cookies?

## Critical Number of Correct Responses in a Triangle Test

-- Entries are the minimum number of correct responses required for significance at the stated  $\alpha$ -level (i.e., column) for the corresponding number of respondents,  $n$  (i.e., row).

-- Reject the assumption of “no difference” if the number of correct responses is greater than or equal to the tabled value.

$n$	$\alpha$						
	0.40	0.30	0.20	0.10	0.05	0.01	0.001
3	2	2	3	3	3	—	—
4	3	3	3	4	4	—	—
5	3	3	4	4	4	5	—
6	3	4	4	5	5	6	—
7	4	4	4	5	5	6	7
8	4	4	5	5	6	7	8
9	4	5	5	6	6	7	8
10	5	5	6	6	7	8	9
11	5	5	6	7	7	8	10
12	5	6	6	7	8	9	10
13	6	6	7	8	8	9	11
14	6	7	7	8	9	10	11
15	6	7	8	8	9	10	12
16	7	7	8	9	9	11	12
17	7	8	8	9	10	11	13
18	7	8	9	10	10	12	13
19	8	8	9	10	11	12	14
20	8	9	9	10	11	13	14
21	8	9	10	11	12	13	15
22	9	9	10	11	12	14	15
23	9	10	11	12	12	14	16
24	10	10	11	12	13	15	16
25	10	11	11	12	13	15	17
26	10	11	12	13	14	15	17
27	11	11	12	13	14	16	18
28	11	12	12	14	15	16	18
29	11	12	13	14	15	17	19
30	12	12	13	14	15	17	19

$n$	$\alpha$						
	0.40	0.30	0.20	0.10	0.05	0.01	0.001
31	12	13	14	15	16	18	20
32	12	13	14	15	16	18	20
33	13	13	14	15	17	18	21
34	13	14	15	16	17	19	21
35	13	14	15	16	17	19	22
36	14	14	15	17	18	20	22
42	16	17	18	19	20	22	25
48	18	19	20	21	22	25	27
54	20	21	22	23	25	27	30
60	22	23	24	26	27	30	33
66	24	25	26	28	29	32	35
72	26	27	28	30	32	34	38
78	28	29	30	32	34	37	40
84	30	31	33	35	36	39	43
90	32	33	35	37	38	42	45
96	34	35	37	39	41	44	48
102	36	37	39	41	43	46	50
108	38	40	41	43	45	49	53
114	40	42	43	45	47	51	55
120	42	44	45	48	50	53	57
126	44	46	47	50	52	56	60
132	46	48	50	52	54	58	62
138	48	50	52	54	56	60	64
144	50	52	54	56	58	62	67
150	52	54	56	58	61	65	69
156	54	56	58	61	63	67	72
162	56	58	60	63	65	69	74
168	58	60	62	65	67	71	76
174	61	62	64	67	69	74	79
180	63	64	66	69	71	76	81