

# Designing a sensory panel and avoiding bias – the basics.

## Introductory Sensory Evaluation

Professor Alex Speers  
B.Sc.(Agr.),Ph.D., FIBD, C.Sci.

International Centre of Brewing and  
Distilling

Heriot-Watt University



# Outline

- Definition
- Bias
- General Requirements
- Various Tests

# Sensory Analysis

Definition: A scientific discipline used to evoke, measure, analyze and interpret reactions to those characteristics of foods and materials that are perceived by the senses of sight, smell, taste, touch and hearing.

# Sensory Analysis

It seems simple but is quite tricky to do right!

People are *\*very\** variable!

Pick a letter?  
(But don't tell)

A B C

# General requirements for sensory testing

## Physical Conditions

General	Minimize external stimuli and psychological distraction. Provide comfortable environment
Location	Central, Freedom from confusion
Layout	Booths recommended

## Physical Conditions

Odour control

No smoking/cosmetics

A/C positive pressure

Odour neutral materials

Lighting

Normal and uniform

Colour lights for masking

General comfort

Table height etc.

## Physical Conditions

### Discrimination tests

Triangle most common used to discern differences

No of panelists 12-20 minimum

### Preference tests

Select 'average' or test population

Randomize develop pool

Eliminate 'experts' never train

No of panelists:

50-100 recommended

Breadth of sample important

20 as a pilot study



## Physical Conditions

Preference tests

Motivation

Important

Interest key

Publicize results

Need management on side

Rewards gifts

Physiological

1 h after meals

Sensitivity

20 min after smoking (dated)

AM best

# General requirements for sensory testing

## Psychological

Sensory testing is applied psychology - remove bias and cues

Use 3 digit coding

Administrator to be neutral

## Sample

### Presentation

Standardize quantities utensils etc

Uniform temperature - normal?

Mask irrelevant factors - lighting, colourants, macerate/blending

Randomize order/presentation

No samples - single stimulus preference up to 6

Paired comparison, 3 pairs

Difference (trained) 6 pairs or 4 triangle

# Various tests – Difference tests

## Forced choice

Determine whether samples differ in any way.

Most sensitive sensory tests and applicable when differences are slight.

Useful in Q.A. and Product Development

Panels are small, pre-selected, trained.

Sample preparation critical to minimize false clues e.g.,

# Various tests – Difference tests

## Triangle Test

3 unknown samples presented together  
(or successively)

2 are same stimuli.

Panelists are asked to select the odd  
sample?

$p = 0.33$  (1/3)

Positional bias - middle sample

# Various tests – Ranking

Rank a group of samples presented together on the intensity of a characteristic

Familiarity with the characteristic is important

## Advantages

- Rapid and simple to administer
- Can test mutable samples

## Disadvantages

- Disregards degree of difference
- Inconsistencies when difference is small
- Can use trained or untrained panels

# Various tests – Ratio scaling

Training

Ranges from nine to elaborate  
Physical stimuli

0      0      0      0      0

assign magnitude

2      3      4      6      8

# Analytical - Discriminative Sensitivity

## Absolute threshold

Minimum detectible level of concentration

Recognition threshold salt .175%

Detection threshold salt .058%

## Difference threshold

Minimum detectible change in concentration or the just noticeable difference

## Criteria of response

Detection - subject identifies difference from a neutral background

Recognition - stimulus identified by the subject

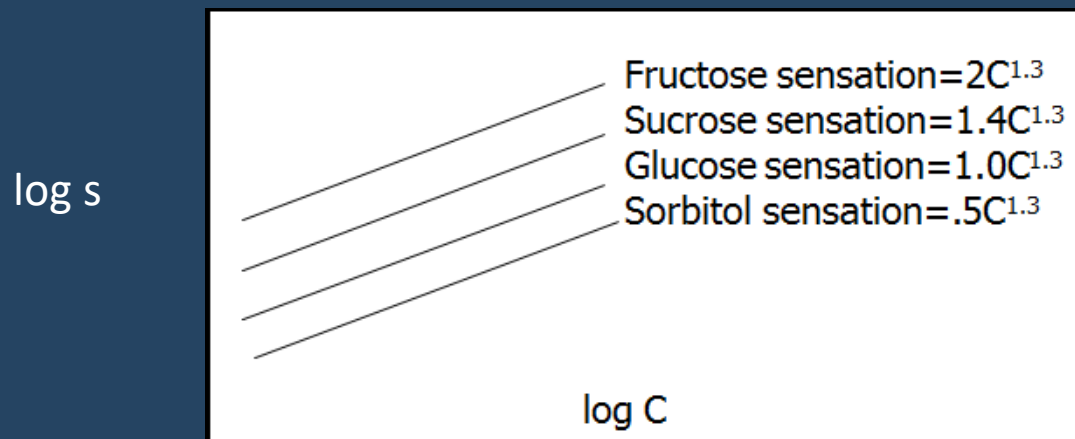
# Psychophysics

Study of the relationship between a stimulus (physical) and the ensuing response or sensation (psychological)



# Psychophysics

Stevens law A power type relationship  
(log of conc  $\propto$  log of perception)



# Analytical - Descriptive Attributive rating

Scale showing several degrees of magnitude

A dimension of evaluation (product characteristic)

Samples presented

Subject is to assign each scale magnitude

More sophistication required of judges than for difference tested

# Flavour Profiles

Phelan et al. WDSC  
2003.

(Courtesy SWRI and  
ICBD)



# Analytical – Gin Flavour Wheel

Courtesy  
of Dr. F. Jack SWRI



# Sensory Analysis

Results only as good as testing

Sensory tests dangerous to extrapolate

Don't worry it is all written down!



A.Speers@HW.AC.UK

# Acknowledgements

The Gin Guild  
WCOD  
Heriot-Watt University  
Francis Jack (SWRI)