

感官測試工作坊2

高科院
Thei

Member of VTC Group
VTC 機構成員

fic

Food Innovation Centre
食品創新中心

SENSORY TRAINING
WORKSHOP 2
BY THEI FIC

TSF

工商機構支援基金
Trade and Industrial Organisation Support Fund

工作坊流程

時間	內容
1300 - 1315	到場登記
1315 - 1345	歡迎辭 食品創新中心簡介
1345 - 1530	理論課: (1) 感官測試方法及應用 (2) 電子舌簡介及應用
1530 - 1545	小休
1545 - 1645	(1) 參觀食品製作實驗室 (2) 參觀感官測試實驗室及電子舌操作示範
1645 - 1700	問答交流

fic 嚟度 你就知味道



食品創新中心(FIC)簡介

網址:

<https://www.thei.edu.hk/faculties-and-department/science-and-technology/facilities/food-innovation-centre/about-us>

<https://www.fichk.com/>

Facebook 專頁: <https://www.facebook.com/ficfoodinnocen/>

Instagram 專頁: https://www.instagram.com/thei_hkfic/

LinkedIn 專頁 : <https://www.linkedin.com/company/hkfic/>

食品創新中心(FIC)成立

- 2021 年正式成立
- 香港高等教育學院(THEi)主辦
- 香港特別行政區政府工業貿易署「工商機構支援基金」資助
- 同健有限公司 (One Health International Ltd.) 贊助



工商機構支援基金
Trade and Industrial Organisation Support Fund

成立目的

- 協助食品業界增強其產品的競爭力，牢固香港美食天堂的美譽。
- 協助推廣食品科技相關的教育和培訓等工作。
- 與本地食品業界合作並進行多方面研究，當中包括包裝和製作流程優化等。
- 積極推動發展創新的食品，配合「電子舌」感官分析技術，為產品增值。



項目總監

方麗影博士
副教授(食品科學及安全課程)

- 食品創新中心
- 科技學院
- 食品與健康科學學系
- 香港高等教育科技學院



項目經理

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- 科技學院
- 食品與健康科學學系
- 香港高等教育科技學院



項目主任

簡永輝先生
項目主任(食品科學及安全課程)

- 食品創新中心
- 科技學院
- 食品與健康科學學系
- 香港高等教育科技學院

FIC 團隊成員



高永文 醫生
骨科專科



支持單位 / 機構

食品创新中心開幕典禮 暨食品專題研討會



7 2 3

請即報名!

香港高等教育科技學院 誠邀您出席
食品创新中心開幕典禮暨食品專題研討會
全港首部電子舌

日期：2022年7月23日
時間：12:00–18:00
地點：香港科學園二期
高錕會議中心演講廳及會議前廳
形式：實體和網上同步進行



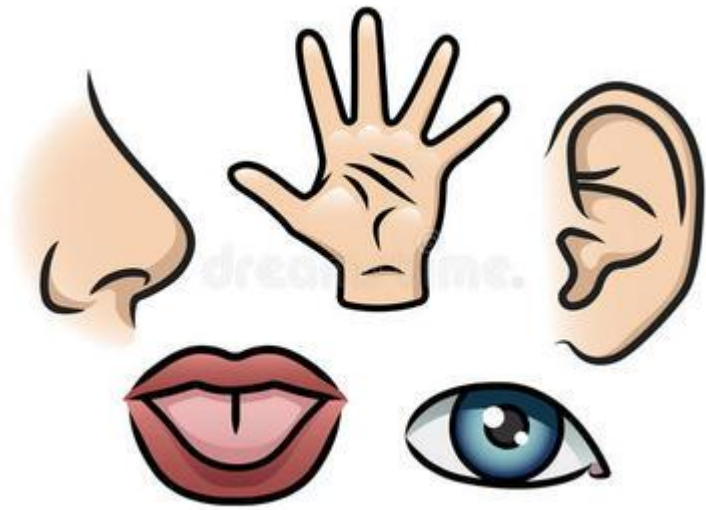
TSF 工商機構支援基金
Trade and Industrial Organisation Support Fund

高科院
Thei

fic
Food Innovation Centre
食品创新中心



感官測試工作坊1 - 回顧



五種基本味道

苦

鹹

酸

甜

鮮

Taste	Compound	Concentration (%)		
		Tip of tongue	Side of tongue	Back of tongue
Salt	NaCl	0.25	0.240 - 0.250	0.28000
Sour	HCl	0.01	0.006 - 0.007	0.01600
Sweet	Sugar	0.49	0.720 - 0.760	0.79000
Bitter	Quinine	0.00029	0.00020	0.00005

理論課

感官測試方法及應用

感官測試

- 一種科學方法，用於喚起、測量、分析和解釋通過視覺、嗅覺、觸覺、味覺和聽覺感知對產品的反應
- 主要分為辨別性和描述性
- 實驗室感官分析
 - 訓練有素的試味員作為分析工具，測量食物的感官特性 (sensory properties / attributes)
- 消費者感官分析
 - 特定消費者群組作為統計樣本，用於測試和預測消費者對食品的反應

感官測試方法的任務

- 從產品構思到發佈後的監控
 - 試驗樣品 → 大規模生產成品
 - 原料 / 配方更改
 - 生產加工流程優化
 - 降低成本/更換供應商

- 提高消費者/產品可接受性
 - 按喜好區分消費者群
 - 研究分析競爭對手的產品
 - 評估新概念可行性
- 質量檢測
 - 確定產品的保質期，以及監察供應鏈可能帶來的變化
 - 感官特性通常比微生物質量較早出現明顯變化

感官測量的影響因素

■ 心理因素

- 預期誤差 (Expectation error)
 - 試味樣品編碼 (隨機 3 位數字, 無字母或顏色)
- 建議影響 (Suggestion effect)
- 分心錯誤 (Distraction error)
- 次序 / 順序影響 (Order effect)

■ 生理因素

- 適應 (Adaption)
- 遺留效應 (Carry-over effect)
- 試味員的身體狀況

■ 文化因素

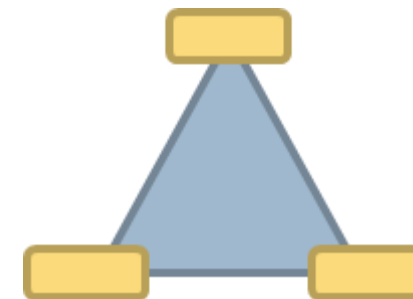
辨別測試 (Discrimination tests)

- 確定兩個 (或以上) 樣本之間存在的差異性 (或相似性)
- 以統計顯著性檢驗 (statistical significance testing) 分析結果數據
 - 確定樣本是否被視作不同 (或相似)
- 通常應用於被認為是“易混淆的”的樣本
 - 極為相似 / 難辨別的產品

食品業界的應用:

- 篩選和培訓專業的試味員
- 勘測污染品 / 次品
- 確定試味員的感官靈敏度閾限 (Threshold)
- 質量監控

1. 三角測試 (Triangle Test)



✓ EN ISO 4120:2021 (MAIN)

Sensory analysis - Methodology - Triangle test (ISO 4120:2021)

◀ BACK # 67.240 CEN/SS C01

ABSTRACT GERMAN FRENCH SLOVENIAN

This document specifies a procedure for determining whether a perceptible sensory difference or similarity exists between samples of two products. The method is a forced-choice procedure. The method is applicable whether a difference exists in a single sensory attribute or in several attributes.

The method is statistically more efficient than the duo-trio test (described in ISO 10399), but has limited use with products that exhibit strong carryover and/or lingering flavours.

The method is applicable even when the nature of the difference is unknown [i.e. it determines neither the size nor the direction of difference between samples, nor is there any indication of the attribute(s) responsible for the difference]. The method is applicable only if the products are homogeneous.

The method is effective for:

a) determining that:

either a perceptible difference results (triangle testing for difference);

a perceptible difference does not result (triangle testing for similarity),

when, for example, a change is made in ingredients, processing, packaging, handling or storage;

b) selecting, training and monitoring assessors.

測試目的：確定兩個樣本之間是否存在差異

測試程序：

1. 準備三個樣本(兩個相同，一個不同)並以三數位編碼標記。
2. 試味員判斷出「不同」的一個。
3. 試每個樣本之間以清水漱口。

Q: 三個樣本可排列出多少組不同的次序？

三角測試

評估員：

日期：

操作說明：

開始前請先用水漱口，您將獲得三個食物樣本，每個樣本都標有一個隨機三位數字編碼。當中兩個為相同產品，一個「不同」。按照預定排列的順序，從左至右評估每個樣本，然後選擇出「不同」的樣本。最後，在下表記錄你的結果。
每次品嚐後，用清水漱口以清洗一下味覺。請選出一個「不同」的樣本並描述其不同之處。

樣本

「不同」的樣本（請以✓表示）

387

523

145

評論：

感謝您的參與！
請通過窗口將您的問卷退回研究人員。

三角測試 - 問卷(範本一)

三角測試 - 問卷(範本二)

Triangle Test

Three samples are presented. Two of them are identical.

Taste them in the specified order and mark the sample which is different from the two others:

☐ 672 ☐ 143 ☒ 515

Then indicate the intensity of the difference:

none weak medium strong very strong



Is the difference due to:

• the aroma: ☒ Yes

☐ No

• the taste: ☒ Yes

☐ No

Triangle
Test for
Difference:
Critical
Number
(Minimum)
of Correct
Answers

Kemp, Sarah E.,
et al. *Sensory
Evaluation : A Practical
Handbook*, John Wiley
& Sons,
Incorporated, 2009.

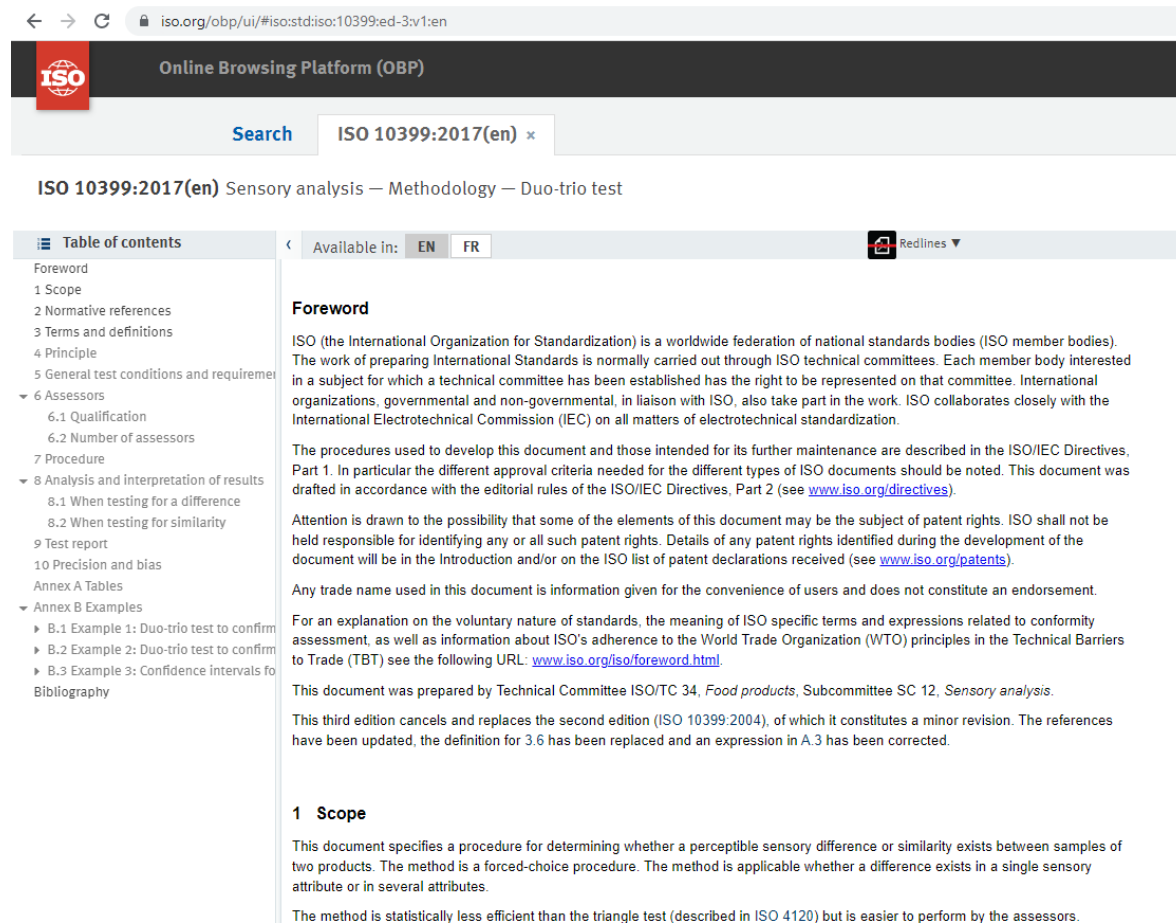
Significance level (%)					Significance level (%)				
n	10	5	1	0.1	n	10	5	1	0.1
3	3	3	-	-	26	13	14	15	17
4	4	4	-	-	27	13	14	16	18
5	4	4	5	-	28	14	15	16	18
					29	14	15	17	19
					30	14	15	17	19
6	5	5	6	-	31	15	16	18	20
7	5	5	6	7	32	15	16	18	20
8	5	6	7	8	33	15	17	18	21
9	6	6	7	8	34	16	17	19	21
10	6	7	8	9	35	16	17	19	22
11	7	7	8	10	36	17	18	20	22
12	7	8	9	10	42	19	20	22	25
13	8	8	9	11	48	21	22	25	27
14	8	9	10	11	54	23	25	27	30
15	8	9	10	12	60	26	27	30	33
16	9	9	11	12	66	28	29	32	35
17	9	10	11	13	72	30	32	34	38
18	10	10	12	13	78	32	34	37	40
19	10	11	12	14	84	35	36	39	43
20	10	11	13	14	90	37	38	42	45
					96	39	41	44	48
21	11	12	13	15					
22	11	12	14	15					
23	12	12	14	16					
24	12	13	15	16					
25	12	13	15	17					

2. 二對三測試 (Duo-Trio Test)

測試目的：確定兩種產品之間是否存在明顯差異

測試程序：

1. 準備三個樣本(兩個相同，一個不同)並以三位數字隨機編碼標記; 其中一款食物樣本作為**對照**。
2. 試味員判斷出跟**對照**相同的一個樣本。
3. 試每個樣本之間以清水漱口。



The screenshot shows the ISO 10399:2017(en) Sensory analysis — Methodology — Duo-trio test document on the Online Browsing Platform (OBP). The page includes a search bar with the text "ISO 10399:2017(en)" and a table of contents on the left. The main content area displays the "Foreword" and "1 Scope" sections.

ISO 10399:2017(en) Sensory analysis — Methodology — Duo-trio test

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- 9 Test report
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 - B.3 Example 3: Confidence intervals for
- Bibliography

Available in: EN FR

Redlines

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 34, Food products, Subcommittee SC 12, Sensory analysis.

This third edition cancels and replaces the second edition (ISO 10399:2004), of which it constitutes a minor revision. The references have been updated, the definition for 3.6 has been replaced and an expression in A.3 has been corrected.

1 Scope

This document specifies a procedure for determining whether a perceptible sensory difference or similarity exists between samples of two products. The method is a forced-choice procedure. The method is applicable whether a difference exists in a single sensory attribute or in several attributes.

The method is statistically less efficient than the triangle test (described in ISO 4120) but is easier to perform by the assessors.

二對三測試 – 問卷(範本)

二對三測試

評估員：

日期：

操作說明：

開始前請先用水漱口，您將獲得三個食物樣本，其中一個會被標注為「對照樣本」和另外兩個樣本會被標注三位數字隨機編碼。

按照提供的順序從左到右評估「對照樣本」和另外兩個隨機編碼樣本，然後確定選擇哪個樣本與「對照樣本」最為相似。在下表記錄你的結果。

每次品嚐評估後，用餅乾和水清潔您的味覺。選出哪個與「對照樣本」相同，並請評論不同樣本的相異之處。

樣本	與「對照樣本」最為相似（請以 ✓ 表示）
036	
619	

評論：

感謝您的參與！
請通過窗口將您的問卷退回服務人員。

Critical values table for duo-
trio test and paired
comparison test for
difference (one tailed)
Kemp, Sarah E., et al. *Sensory
Evaluation : A Practical
Handbook*, John Wiley & Sons,
Incorporated, 2009.

<i>n</i>	Significance (%)			<i>n</i>	Significance (%)		
	5	1	0.1		5	1	0.1
5	5	–	–	29	20	22	24
6	6	–	–	30	20	22	24
7	7	7	–	31	21	23	25
8	7	8	–	32	22	24	26
9	8	9	–	33	22	24	26
10	9	10	10	34	23	25	27
11	9	10	11	35	23	25	27
12	10	11	12	36	24	26	28
13	10	12	13	37	24	26	29
14	11	12	13	38	25	27	29
15	12	13	14	39	26	28	30
16	12	14	15	40	26	28	30
17	13	14	16	41	27	29	31
18	13	15	16	42	27	29	32
19	14	15	17	43	28	30	32
20	15	16	18	44	28	31	33
21	15	17	18	45	29	31	34
22	16	17	19	46	30	32	34
23	16	18	20	47	30	32	35
24	17	19	20	48	31	33	36
25	18	19	21	49	31	34	36
26	18	20	22	50	32	34	37
27	19	20	22	52	33	35	38
28	19	21	23	56	35	38	40

<i>n</i>	Significance (%)			<i>n</i>	Significance (%)		
	5	1	0.1		5	1	0.1
60	37	40	43	84	51	54	57
64	40	42	45	88	53	56	59
68	42	45	48	90	54	57	61
70	43	46	49	92	55	58	62
72	44	47	50	96	57	60	64
76	46	49	52	100	59	63	66
80	48	51	55				

3. 配對比較測試 (Paired Comparison Test)

測試目的：確定兩個樣本之間是否存在**指定屬性**的差異，例如香味的強度、甜味和硬度。

測試程序：

1. 準備兩個不同的樣本並以三位數字隨機編碼標記。
2. 試味員判斷出兩者中哪個具有**指定屬性**的最大強度。
3. 試每個樣本之間以清水漱口。

ISO 5495:2005(en) Sensory analysis — Methodology — Paired comparison test

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- 10 Precision and bias
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 - A.1 Determination of perceptible difference
 - A.2 Statistical approach for the determination of similarity
- Annex B Examples
 - B.1 Example 1 — One-sided paired test
 - B.2 Example 2 — One-sided paired test
 - B.3 Example 3 — Two-sided paired test
 - B.4 Example 4 — Two-sided paired test
 - B.5 Example 5 — Confidence intervals
- Bibliography

Available in: EN FR

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 5495 was prepared by Technical Committee ISO/TC 34, Food products, Subcommittee SC 12, Sensory analysis.

This third edition cancels and replaces the second edition (ISO 5495:1983), which has been technically revised.

1 Scope

This International Standard describes a procedure for determining whether there exists a perceptible sensory difference or a similarity between samples of two products concerning the intensity of a sensory attribute. This test is sometimes also referred to as a directional difference test or a 2-AFC test (Alternative Forced Choice). In fact, the paired comparison test is a forced choice test between two alternatives.

配對比較測試 – 問卷(範本)

配對比較測試

評估員：

日期：

您將收到兩份軟餐樣品。請評估每個樣品的柔軟度並確定哪個最柔軟。要評估柔軟度，請將樣本逐次放到上顎和舌頭之間按壓至可吞嚥程度。在下面記錄你的結果。

開始前請先用水漱口，從左到右依次品嚐兩款食物樣本，你可決定品嚐的分量，但至少要品嚐所提供分量的一半。

樣本

最柔軟（請以 ✓ 表示）

387

523

感謝您的參與！

請通過窗口將您的問卷退回服務人員。

喜好／偏好測試 (Preference Test)

測試目的：評估消費者對產品的喜好程度

測試方法：

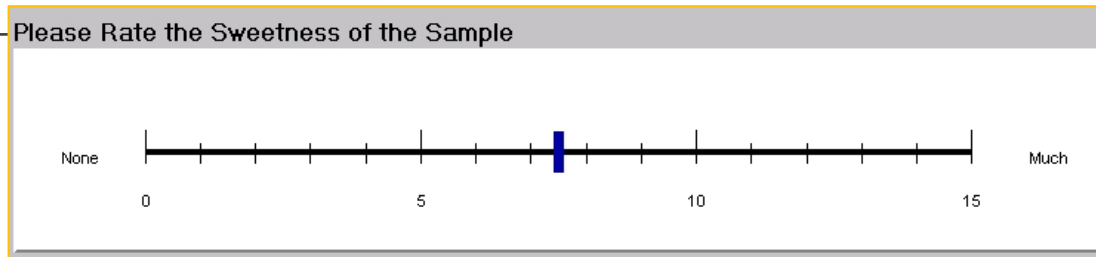
- 配對偏好測試 (paired preference test)
- 等級排序測試 (ranking test)
- 嗜好測試 (hedonic test)
- 描述分析測試 (descriptive analysis test)

Panelist Hedonic Rating	Liking Score
Like Extremely 極	9
Like Very Much 非常	8
Like Moderately 一般	7
Like Slightly 略	6
Neither Like Nor Dislike	 5 
Dislike Slightly 略	4
Dislike Moderately 一般	3
Dislike Very Much 非常	2
Dislike Extremely 極	1

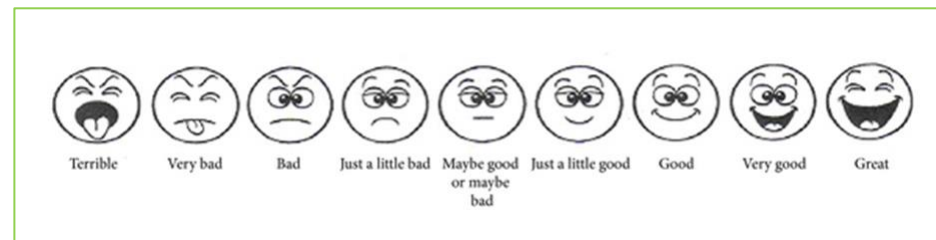
九分制嗜好評分法 (9-Point Hedonic Scale)

常用的評分法 (Scaling Method)

❖ 線評分法 (Line scale)



❖ 面部表情評分法 (Facial scale)



❖ Just-About-Right (JAR) scale

Much Too Little	Too Little	Just About Right	Too Much	Much Too Much
☐	☐	☐	☐	☐

❖ 屬性強度評分法 (Attribute intensity scale)

Sweetness:						
☐	☐	☐	☐	☐	☐	☐
Not sweet						Very sweet
Graininess:						
☐	☐	☐	☐	☐	☐	☐
Not grainy						Very grainy

Preference test - Ranking

Assessor:

Date:

Instruction:

Please rinse your mouth with water before starting.

You may rinse again at any time during the test when you need to.

Please taste the five samples in the order presented, from left to right.

You may re-taste the samples once you have tried all of them.

Rank the sample from most preferred to least preferred using the following numbers:

1 = most preferred, 5 = least preferred

If you have any questions, please ask the server now

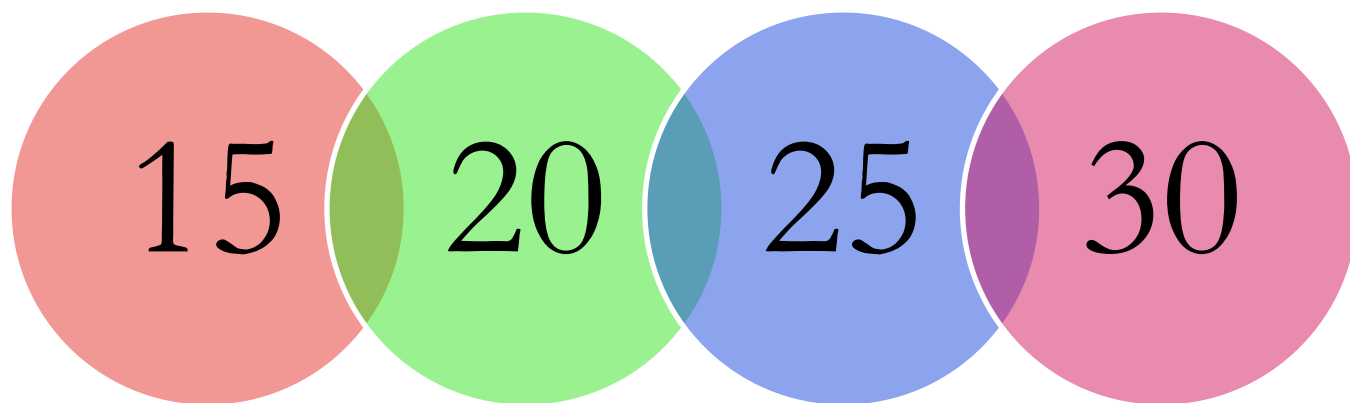
Sample	Rank
387	
589	
233	
694	
521	

Thank you for your participation!

Please return your ballot through the window to the server.

等級排序 測試 (Ranking Test)

具代表性的評估員樣本人數下限？



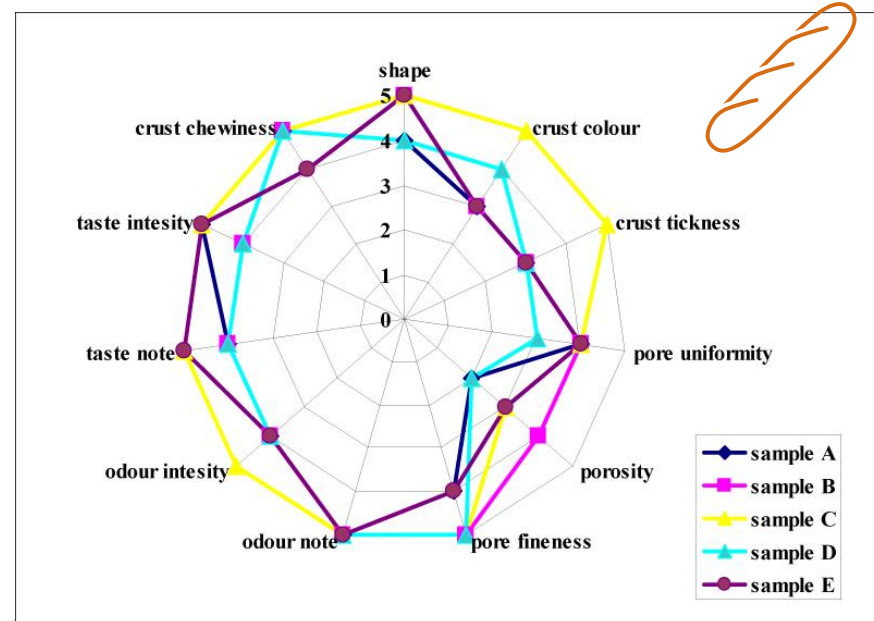
描述分析測試 (Descriptive Analysis Test)

❑ 詳盡描述食物的感官屬性 (sensory attributes)

- ❑ 外貌 (appearance)
- ❑ 香氣 (aroma)
- ❑ 味道 (flavour)
- ❑ 口感 (oral texture)
- ❑ 幾何參數 (geometrical parameters)
- ❑ 脂肪/水分參數 (fat/moisture parameters)
- ❑ 膚感 (skinfeel)

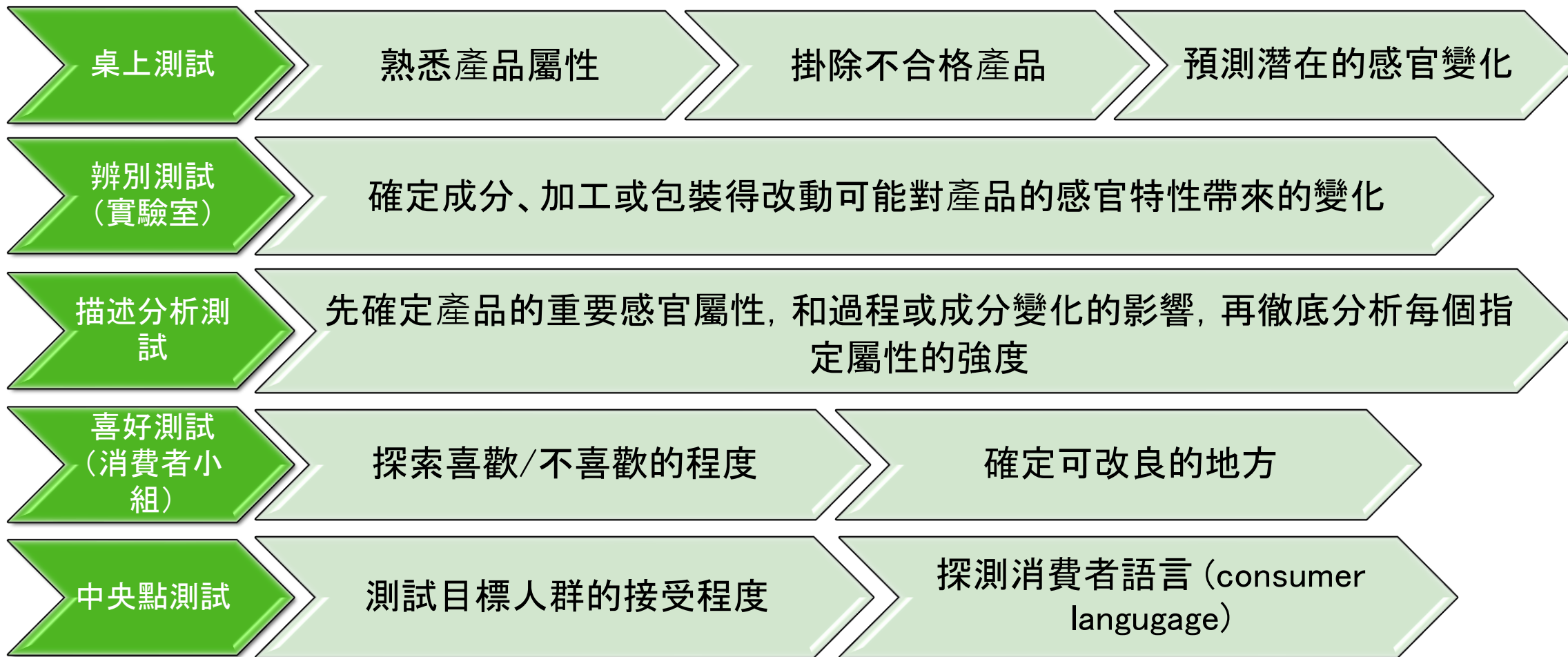
❑ 牽涉定性 (qualitative) 和定量 (quantitative) 感官屬性的描述和分析

❑ 通常以小組形式進行



常用的描述分析測試方法

- 1.Flavour profile[®]
- 2.Texture profile[®]
- 3.Quantitative descriptive analysis (QDA)[®]
- 4.Spectrum analysis[®]
- 5.Time-Intensity descriptive analysis[®]
- 6.Free choice profiling[®]



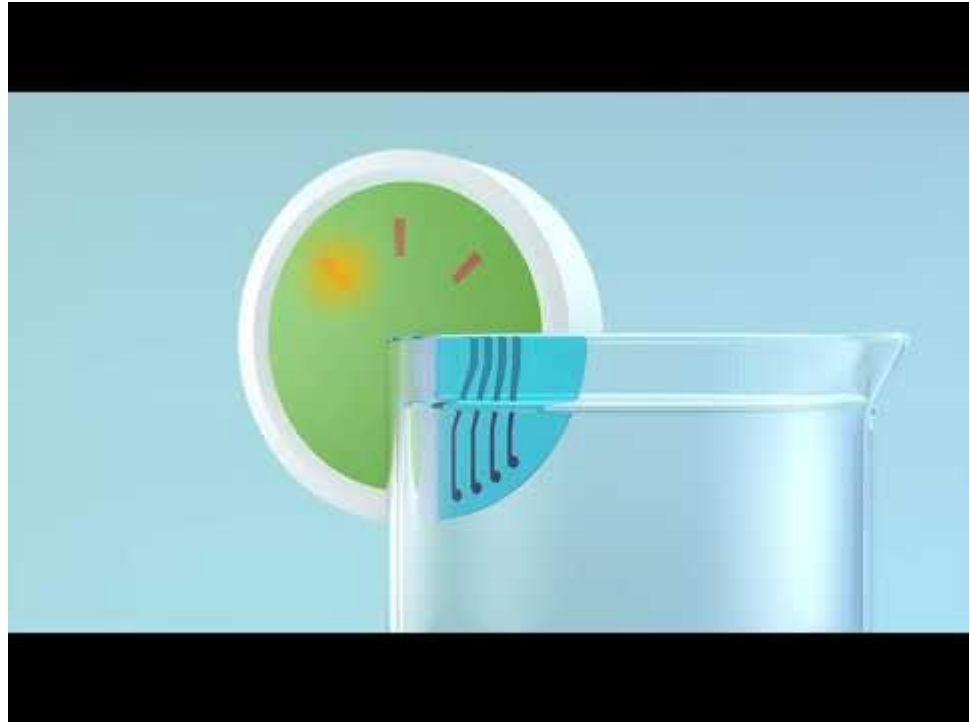
測試程序

電子舌簡介及應用

理論課

IBM研「電子舌頭」辨認液體 減工業檢測、品質監管程序

[News link](#)



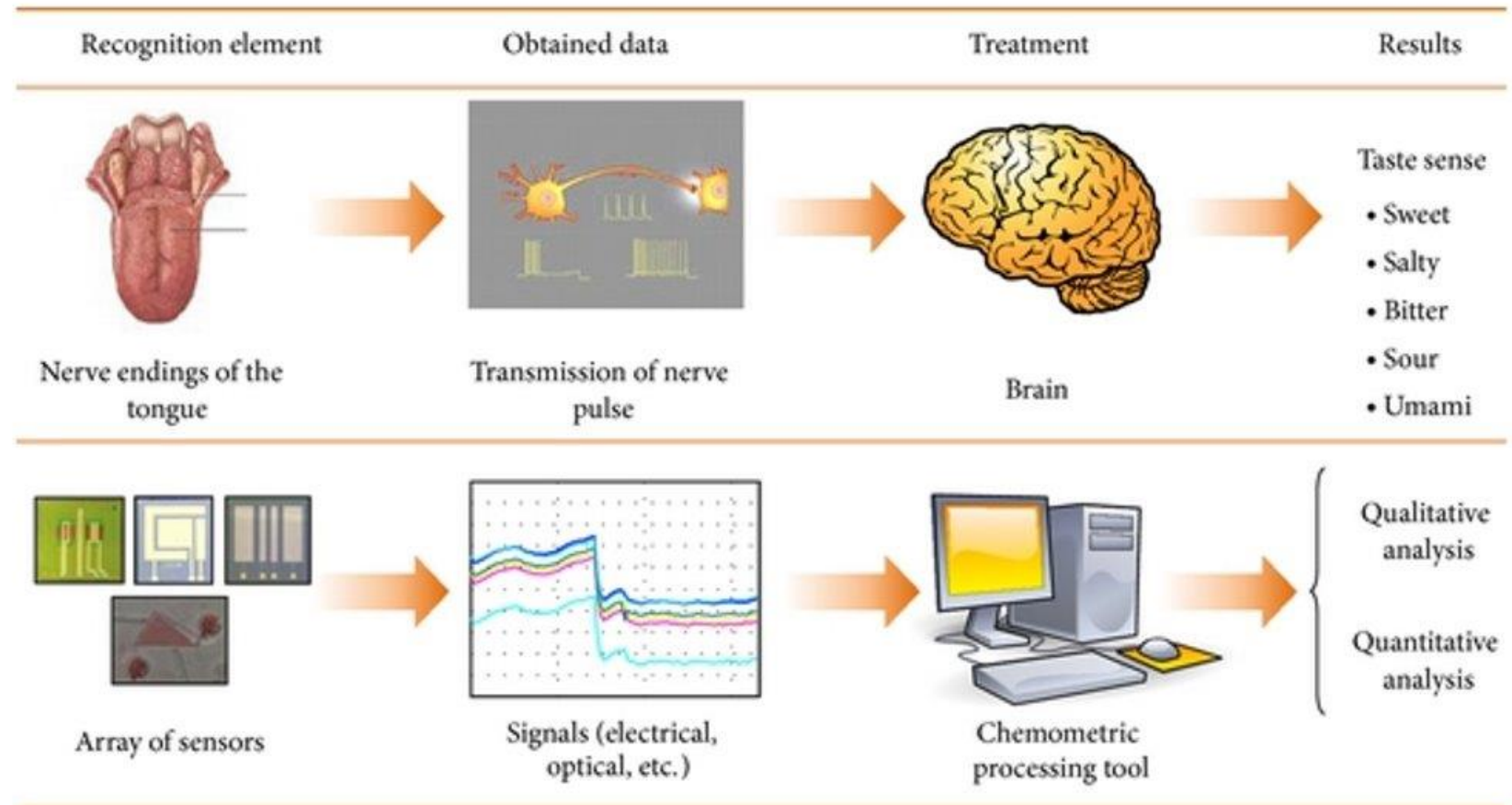
IBM Hypertaste: An AI-assisted e-tongue for fast and portable fingerprinting of complex liquids



傳統感官分析的限制

- ❑ 人類的極限 / 數據分析能力
- ❑ 人類的感官系統作為量度儀器
- ❑ 感官接受的限制 (感官能力有限)
- ❑ 決策能力限制
- ❑ 全球性大流行？

人類 VS 機器人





ANALYSIS SETTINGS



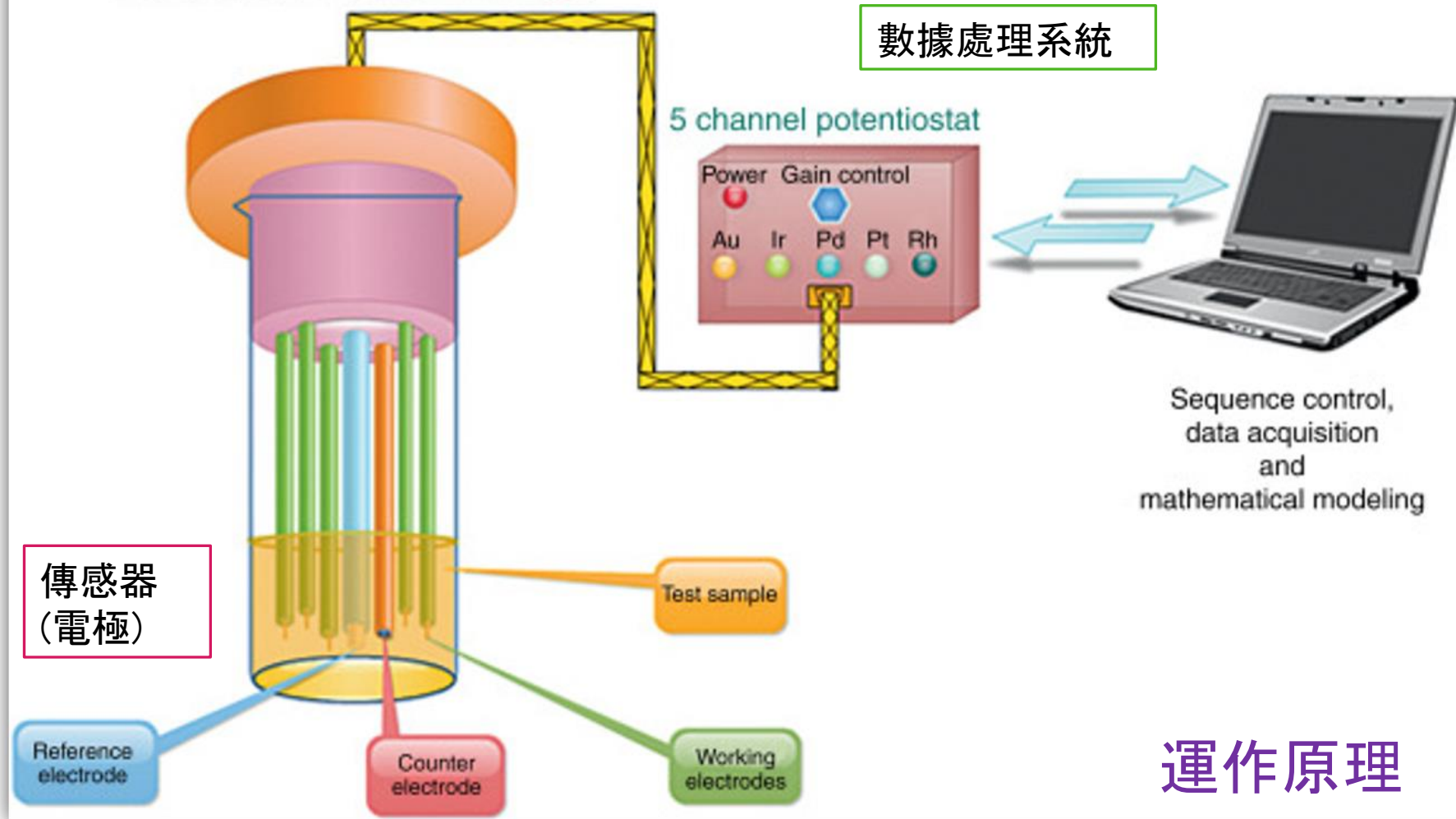
Samples sequence



Analytical method



The voltammetric electronic tongue



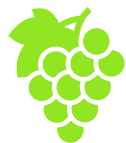
運作原理



電子舌頭品酒



備製樣品



備製味覺參考標準

例如果糖作為葡萄酒甜度
的品嚐標準



電子舌校準

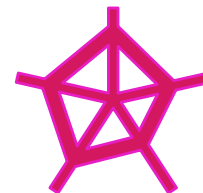


口味分析

葡萄酒的獨特味道(甜味、
酸味、鮮味、澀味)



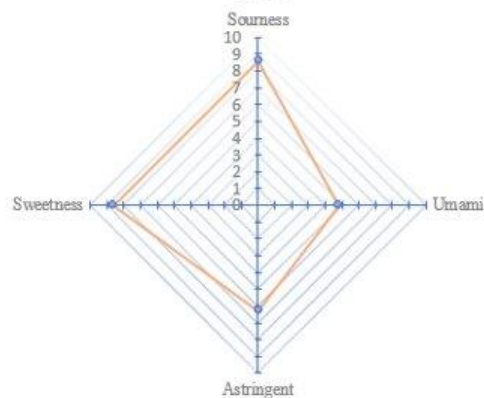
解讀成味覺標籤



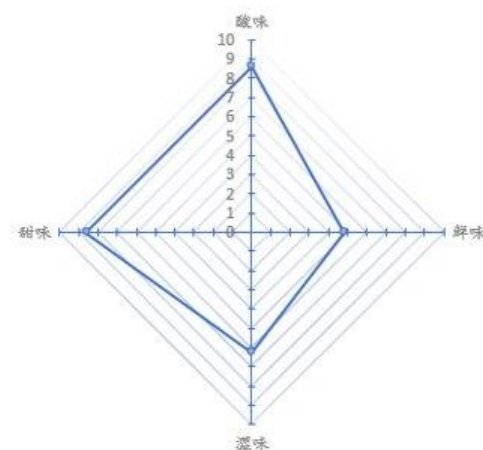
PINOT GRIGIO 的味覺標籤



Sensory Label for Pinot Grigio, Delle Venezie, Cesari, Italy
2017



2017年 義大利賽莎瑞酒莊灰皮諾味道標籤



Grape Variety: Pinot Grigio

葡萄品種：灰皮諾白葡萄

Alcohol level (%)

13.5%

pH value

3.62

Viscosity (cP)

16

Brix (% sucrose)

5.9

酒精濃度 (%)

13.5%

酸域值

3.62

粘度

16

糖度 (%蔗糖)

5.9



泡茶條件對口味的影響

熱泡法

100°C水溫

泡5分鐘



冷泡法

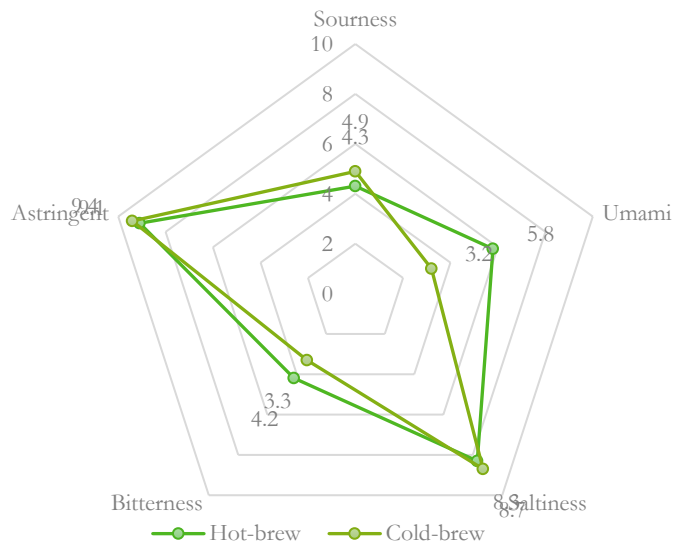
25°C水溫

冷藏12小時

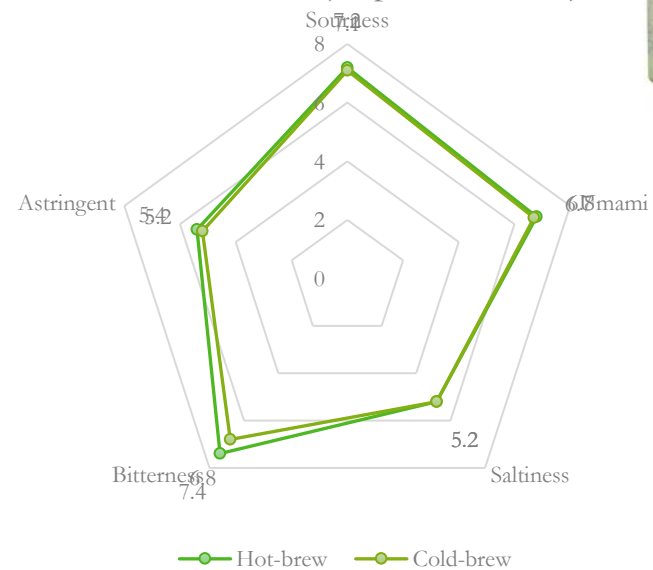




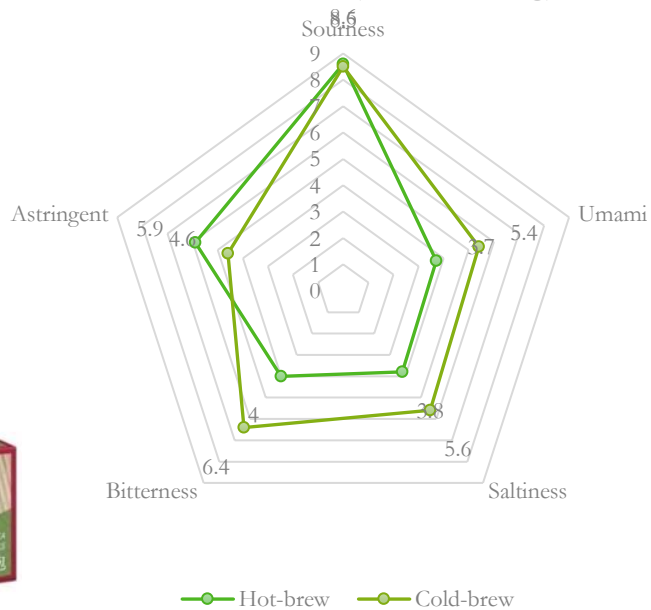
Green Tea 135 (Luk Yu)



Green Tea 426(Imperial Choice)



Green Tea 389(Yu Pin King)



Green Tea 471 (Rickshaw)

