HAL
open science

# Development and internal validation of a fat-, sweet- and salt-liking questionnaire

Amélie Deglaire, Caroline Méjean, Katia Castetbon, Emmanuelle Kesse-Guyot, Christine Urbano, Serge Hercberg, Pascal Schlich

## To cite this version:

Amélie Deglaire, Caroline Méjean, Katia Castetbon, Emmanuelle Kesse-Guyot, Christine Urbano, et al.. Development and internal validation of a fat-, sweet- and salt-liking questionnaire. 4. Conference on sensory and consumer research. A sense of quality, Sep 2010, Vitoria-Gasteiz, Spain. 1 p., 2010. hal-01186793

**HAL Id: hal-01186793**

**https://hal.science/hal-01186793v1**

Submitted on 8 Mar 2017

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

# Development and Internal Validation of a Fat-, Sweet- and Salt-liking Questionnaire

A. Deglaire[1*], C. Méjean[2], K. Castetbon[2], E. Kesse[2], C. Urbano[1], S. Hercberg[2], P. Schlich[1]

[1] Food and Behaviour Research Center, INRA/CNRS/Université de Bourgogne/Agrosup, Dijon, **France**

[2] Nutritional Epidemiology Research Unit, INRA/INSERM/CNAM/Université Paris 13, InVS, Bobigny, **France**

## Introduction

- **Overconsumption of Fat, Sugar or Salt: Risk for Health** (WHO/FAO, 2003)
- **Positive relationship** between **dietary consumption and hedonism**
- **Measure related to fattiness, sweetness and saltiness**
  - Dietary consumption: standardized tools (nutritional epidemiology)
  - Overall Liking: no tool (sensory science)

⇨ **EpiPref Project:** develop & validate tools (sensory tests & questionnaire) to measure the **overall liking** for saltiness, sweetness and fattiness

## Objectives

**Development** (1) & **validation** (2) of an internet-based **questionnaire** (epidemiological approach) measuring the **overall liking** for **fattiness, sweetness and saltiness :**

(1) Literature Review + Expert Consultation + Pre-Tests

(2) Pilot study to measure

- Feasability / Reproducibility
- Internal Validity

## Questionnaire Content

*Number of items (questions) per sensory sensation and type of question*

| Sensory Sensation | Type of Question: Liking for foods | Preferred level of seasonning | Preferred dishes in a menu | Dietary behaviour | Total |
|---|---|---|---|---|---|
| Fatty-Sweet | 22 | 10 | 3 | 4 | 39 |
| Sweet | 20 | 9 | 3 | 4 | 36 |
| Fatty-Salty | 36 | 13 | 3 | 3 | 55 |
| Salty | 0 | 9 | 2 | 6 | 17 |
| Total | 78 | 41 | 11 | 17 | 147 |

- Distractors (n=8 items), socio-demographic (n=8) & feasibility questions (n=8)
- Total number of items in the entire questionnaire: 171 items

## Participants and Administration

- **198 participants** (108 women, 90 men) , **mean age**: 39 years (SD=12)
- **Web-based administration in duplicate** (test-retest)
- **Retest :** 24 days (SD=3) after the test, 74% of the participants

## Statistical Analysis

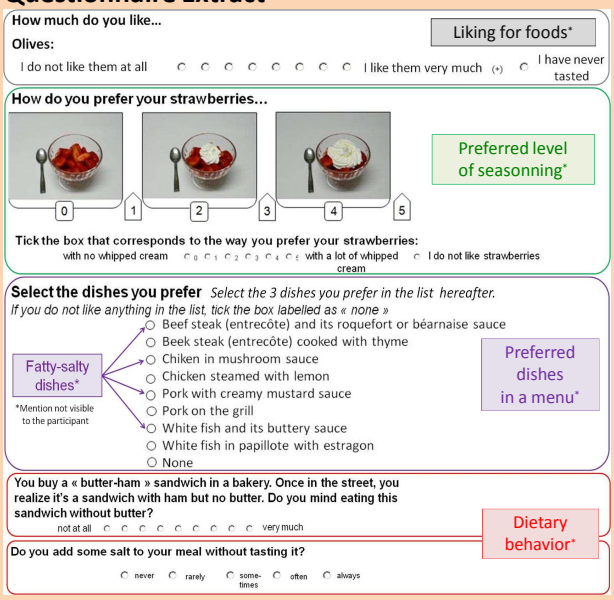
- **Repetability:** RV coefficient & Pearson Correlation Coefficient
- **Data Preparation:** linear transformation of the ratings into values Є [0;1]

«Never Tasted» point: replaced for each participant by the mean of its ratings over the corresponding sensory sensation

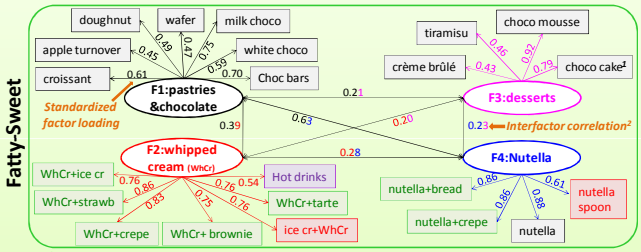
- **Internal Validity** over each sensory sensation:

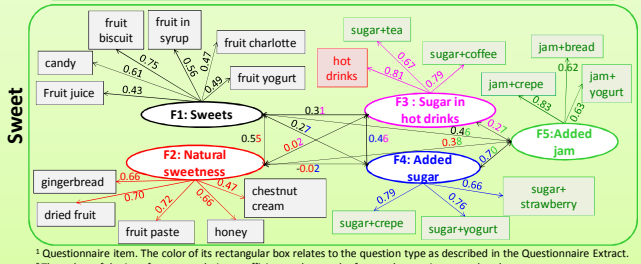
1. Factorial Structure of the Questionnaire: **Exploratory Factor Analysis**, SAS® Proc Factor, Principal Component Extraction , Oblique Rotation
2. Model improvement and Validation: **Stuctural Equation Modeling**
   - SAS® Proc CALIS (**C**ovariance Analysis of **LI**near **S**tructural equations ), Maximum Likelihood (ML) Estimation
   - Goodness of Fit Indices: Satorra-Bentler correction for non-normality (Robust ML), R software, LAVAAN package

## Questionnaire Extract

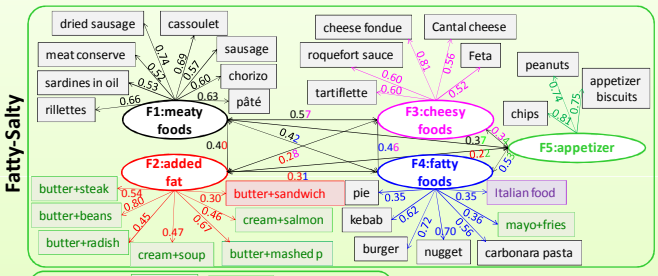


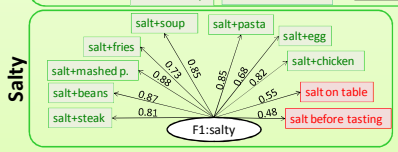

## Results (1/2): *Statistically Validated Models* (based on Internal Validity)




¹ Questionnaire item. The color of its rectangular box relates to the question type as described in the Questionnaire Extract.
² The colors of the interfactor correlation coefficients relate to the factors that are intercorrelated.




**Internal Consistency of the factors**
(F1,F2,...=latent/underlying variables)

**Cronbach's Alpha** over each factor within each sensation **≥ 0.70** (acceptable level)

**Goodness of Fit Indices**

**Acceptable level to validate a model**

- Ratio $\chi^2$:degree of freedom **≤ 2**
- Comparative Fit Index (CFI) **≥ 0.90**
- Root Mean Square Error of Approximation (RMSEA) **≤ 0.08**

*Cf. Kline R.B.,2005*

| Goodness of Fit Indices | Fatty-sweet | Sweet | Fatty-salty | Salty |
|---|---|---|---|---|
| Satorra-Bentler Scaled $\chi^2$ | 390 | 270 | 611 | 75 |
| Degree of freedom | 203 | 160 | 424 | 35 |
| Ratio $\chi^2$:df | 1.92 | 1.69 | 1.44 | 2.14 |
| **CFI** | 0.90 | 0.90 | 0.89 | 0.96 |
| **RMSEA** | 0.07 | 0.06 | 0.05 | 0.08 |

## Results (2/2)

- ***Feasability***
  - **Mean duration :** 28.8 min (SD: 8.9). Too long for 22% participants
  - **Questionnaire difficult:** 1% participants
  - **Questionnaire annoying:** 6% participants
- ***Repeatability***
  - **Mean Pearson Correlation Coefficient** between the test and retest scores based on the rating mean over each factor of each sensory sensation: **0.87** (SD:0.04, P<0.0001)
  - **RV-coefficient** (generalised correlation coefficient) between test and retest for the judge space: **0.81** (highly significant, permutation test)

## Discussion & Conclusion

- In overall: 84 items (out of 147) selected through the factorial analyses
- **Feasability**: questionnaire length to be reduced (item deletion, uploading improvement)
- **Repeatability**: demonstrated
- **Internal Validity**: demonstrated. Questionnaire applied to thousands of French people : factorial structure relatively similar.
- **«External Validity»**: liking assessed by the present questionnaire and by sensory tests (not presented here). Within each sensation, correlations between the sensory scores and the questionnaire scores arising from factors based on the «preferred level of seasonning» (mean correlation: 0.51±0.13, P<0.05).