

# COMPARISON OF METHODS FOR PANEL CONSISTENCY ASSESSMENT AND A NEW PROPOSITION

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## Context

- ▶ Ability to detect differences is essential when selecting panelists, as well as the panel's repeatability and reproducibility, consonance, and agreement on interpreting attributes in a similar way
- ▶ We present a comparative analysis of three methods for sensory panel evaluation, using data obtained from a case study using the Spectrum protocol

## Method

Methods compared are:

- ▶ **Consonance analysis** (Dijksterhuis, 1995) – is a method to evaluate the consonance between panelists in a sensory panel based on the results of a statistic derived from PCA (Principal Component Analysis)
- ▶ **Reproducibility and repeatability analysis** (Rossi, 2001) - was performed on each attribute following the prescription in the Reference Manual developed by the Automotive Industry Action Group (AIAG), which recommends using a two-way ANOVA when performing evaluations (AIAG, 2010)
- ▶ **Internal consistency test based on the Cronbach's Alpha (CA) coefficient** (Cronbach, 1951) - measures the similarity in panelists' evaluation profiles, indicating those whose assessments are inconsistent with the rest of the panel. CA was used in two different ways: (i) to obtain an overall panel performance assessment considering all products simultaneously; and (ii) to assess panel performance considering each attribute individually

## Case study

- ▶ Methods applied to a dataset obtained in a sensory evaluation panel
- ▶ Eight products evaluated by 9 panelists regarding 24 attributes
- ▶ Products prepared through the Combat Ration Advanced Manufacturing Technology Development Program at the Food Manufacturing Technology Facility in Piscataway, NJ, in 1994
- ▶ Product formulations based on military specifications for beef stew in meal-ready-to-eat pouches
- ▶ Evaluations performed following Spectrum protocol

## Results and Discussion

- ▶ Table 1 sums up results from applying the three methods in the case study dataset
- ▶ Results converge for the most part, since attributes A16, A19, A18, A22, A21 and A1 were ranked in the first seven positions independent of the method
- ▶ Results indicate that although based on different groundings all methods consistently indicate attributes best evaluated by panelists

Table 1. Comparison of results – ranking of attributes

$\alpha$	R&R	C
A21	A22	A22
A22	A21	A21
A18	A18	A18
A19	A3	A16
A20	A16	A19
A16	A1	A1
A1	A19	A4

## Conclusions

The internal consistency test based on the CA coefficient was deemed the best choice of method to verify sensory panel consistency for at least 2 reasons:

- ▶ Its calculations are grounded on relationships between variances and covariances, yielding a proximity measure between evaluation profiles from different panelists
- ▶ It is a method easily implementable and computationally undemanding

## References

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