Parametric modeling of time intensity data collected on product prototypes generated from a fractional factorial experiment to quantify sources of texture variability

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Trained panels have been used to evaluate the sensory properties of food products for a number of years. Time-intensity sensory methodologies have been developed to identify and quantify the temporal sensory properties foods and beverages. The data collected is represented in an intensity curve over time. Over the years, several multivariate data analysis techniques have been proposed to characterize time-intensity curves. One specific technique, fitting a parametric model to individual respondent curves, was proposed by Eilers and Dijksterhuis [1]. The model parameters quantify meaningful characteristics of the time-intensity curves: up and down slopes, times at which the curves reach and begin descent from the peak height, and the peak height itself.

The use of statistical experimental designs to direct the creation of product prototypes so that the effects of ingredient levels and/or processing condition changes can be statistically modeled has become prevalent in the food industry in the last decade. Use of these designs in projects for cost reduction, quality improvement and variation reduction has helped to make the product development process more scientific and efficient.

This paper will discuss how the two methodologies have been used together in a project where the objective was to identify ingredient levels and/or processing conditions that most effect product variability. The parametric model fitting process, assessment of respondent repeatability and reproducibility, and the statistical modeling of the time-intensity response curve parameters with respect to the statistical experimental design will be described in detail. A discussion of how the resultant modeling directed future development efforts will demonstrate the utility of the pairing of these methodologies.

References

1. A Parametric Model for Time--Intensity Curves, Paul H. C. Eilers and Garmt B. Dijksterhuis, submitted to Food Quality and Preference.