Introduction to Bayesian Methods for Sensory & Consumer data

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Aims and Scope

Bayesian statistical analysis has been successfully used in other industries for many years now, yet is rarely seen in the sensory and consumer world. This technique offers an approach to formally combine historical data with current data to see results of trials put into context with past research rather than treating each trial in isolation and then making subjective interpretations.

Additionally, benefits are seen in both reduction of sample sizes and increased ability to make robust decisions with a move away from reliance on the contentious 'p-value'.

In this tutorial, we give you the background understanding to the key concepts of these analysis methods, that needs to be understood before a Bayesian study can be set-up and we give information on how to interpret and apply results of a Bayesian analysis to improve decision making ability and so maximising use of your data. Practicalities of taking this approach are also discussed.

The aim of this tutorial is to

- Give examples of how Bayesian methods could apply to sensory and consumer data
- Introduce and explain the key Bayesian concepts
- Present new ways of decision making
- Discuss the practicalities of using a Bayesian approach

Outline

Topics will include:

1. **Bayes theorem and how we use it**
   - Motivational example – meet the chefs!
   - Bayes theorem revised
   - Intro to the idea of Bayesian analysis
   - Comparison with frequentist methods
   - DIY Bayesian analysis
2. **Priors**
   - What is a Prior?
   - Informative vs Vague Priors
   - What distributions can we use?
   - Construction of Priors
3. **Posteriors**
   - What does the posterior look like?
   - Impact of Priors on the Posterior

- Summarising Posteriors
- Different sorts of credible intervals

4. **Bayesian decision-making**
   - Introduction
   - Study Success
   - Was the analysis suitable?
5. **Practicalities of running a Bayesian approach**
   - Types of models
   - The Simulation Approach
   - Checks for Convergence
   - Software to perform Bayesian analysis

Duration: 0.5 day

Audience: Students, researchers or professionals who would like to learn more about this methodology, or who would like to consider a potential new way of analysing consumer data.

Background: No prior knowledge is required.

Requirements: No laptops needed. A calculator may be handy although not essential!