

## Hands on Sensory Statistics

A course designed to give you the knowledge, practice and tools to do your own design, analysis and interpretation of sensory profile data.

Course Developed and Written by Hal MacFie and Anne Hasted

Presented by Anne Hasted, Qi Statistics Ltd  
**27th -29th March 2019**

*Venue:*

*Châteaufort College, L'Ecole de l'Histoire,  
69 ter, rue de la Chapelle  
75018 Paris, France*

### Course Summary

The course forms a hands-on introduction to those statistical methods needed by a sensory scientist. Emphasis is given to the practical decision making based on the results of each analysis. Participants will apply the methods to real life data using XLSTAT and SenPAQ software and will be guided by the written solutions that are a unique feature of our training. These solutions give you the possibility to pick up the notes after 6 months or a year and remind yourself how the technique works and then apply it to your own data. The course fee includes a fully licensed copy of SenPAQ, our easy to use software for analysis of profile data.

### Software

In the training room you will have a computer with XLSTAT and SenPAQ installed but you are welcome to bring your own laptop if you prefer. We can provide you with a licence for XLSTAT at a 30% discount either as you book or at the end of the training.

### The Trainer

Anne Hasted began her career as an academic statistician at Reading University. She is the founder and senior consultant at Qi Statistics Ltd, a UK based consultancy, offering statistical training and consultancy support to research and industry. She has many years training and consultancy experience in the food industry, particularly in the areas of consumer and sensory research and is well recognised for providing user friendly training courses. If you have any questions about the course or registration queries please contact Anne on [anne@qistatistics.co.uk](mailto:anne@qistatistics.co.uk)

## Course Schedule

March 27th	
9.00-9.15	Introductions
9.15-12.30	<p><b>Analysis of Variance Sensory Descriptive Data</b></p> <p>Basic Statistics Refresher, Review of QDA approach, intuitive assessment of noise variation. Analysing QDA using analysis of variance. Testing for sample differences using a mixed model, least significant difference, multiple comparison tests. Mixed models</p> <p>SenPAQ and XLSTAT exercises</p>
12.30-13.30	<i>Lunch</i>
13.30-15.00	<p><b>Panel Monitoring</b></p> <p>Measuring discrimination, repeatability, consistency (partition of interaction effect, assessor v panel correlations). Understanding SenPAQ output. MAM analysis. Setting up a traffic light system for panel performance. XLSTAT module for panel performance. Review of Panel Check and EyeOpenR</p> <p>SenPAQ and XLSTAT exercises</p>
15.00-15.15	<i>Tea</i>
15.15-16.15	<p><b>Discrimination Tests.</b></p> <p>Concept of statistical power, discrimination tests- sample size calculations. Triangle v Tetrad. Thurstonian models versus guessing models. Similarity testing – importance of confidence intervals. Exercises using free VPOWER software</p>
16.15-17.00	<p><b>Non-Parametric Testing</b></p> <p>Non-parametric testing. How to analyse data collected as ranks. Application of non-parametric methods when ANOVA fails. XLSTAT exercises</p>
Evening	<b>Course Dinner</b>
March 28th	
9.00-11.00	<p><b>Principal Component Analysis of QDA Data</b></p> <p>Covariance, correlation. Interpreting correlation using cosines. Geometric interpretation of PCA. PCA of sensory data-covariance or correlation? Methods to determine dimensionality. Supplementary variables and observations. Effect of outliers, Varimax rotation. How is PCA different to factor analysis. Exercises in SenPAQ and XLSTAT</p>
	<i>Break</i>

11.15-12.30	<b>Cluster Analysis of Products and Variables</b> Similarity/dissimilarity measures. Standardisation, How does Agglomerative Hierarchical Classification (AHC) work? Recommended settings. Clustering products and variables – linking with PCA XLSTAT Exercises
12.30-13.30	<i>Lunch</i>
13.30-14.30	<b>Multiple Factor Analysis (MFA)</b> Theory and RV coefficients. Combining sensory, instrumental and liking data. Application to Napping. XLSTAT Exercises
14.30-14.45	<i>Break</i>
14.45-16.00	<b>Canonical Variates Analysis (CVA)</b> Discriminant analysis (DA). Canonical Variates (CVA). Application to mapping sensory profile data at assessor level. Graphical displays, confusion matrix. SenPAQ and XLSTAT exercise
16.00-17.00	<b>Sorting Tasks and Multi-Dimensional Scaling</b> Sorting trials What is MDS – analysing distance and similarity matrices. XLSTAT Exercise
March 29th	
9.00-10.30	<b>Relating Sensory, Instrumental and Consumer Data 1</b> Linear regression, multiple regression. Modelling curvature, overfitting, stepwise regression. Principal components regression XLSTAT Exercises
	<b>Break</b>
10.45-12.30	<b>Relating Sensory, Instrumental and Consumer Data 2</b> Partial Least squares regression compared to PCA regression. Geometric interpretation. Understanding $Q^2$ , VIP and standardised coefficients. Assessing dimensionality using cross validation. Relating sensory and instrumental data, relating liking to sensory data. XLSTAT Exercises
12.30-13.30	<i>Lunch</i>
13.30-14.30	<b>Temporal Measurement</b> Repeated measures, problems of correlated errors, model fitting and three way PCA and PLS
14.30-14.45	<i>Break</i>
14.45-15.45	<b>From Time Intensity to Dominance to TCATA</b> Review of methods
16.00	<b>Close</b>

## Training Facility



Châteauform' College  
L'École de l'Histoire  
69 ter, rue de la Chapelle  
75018 Paris



By train  
Metro Line 12 : Porte de la Chapelle. Sortie n°4 Rond-point de la Chapelle  
Tramway Line T3b : Porte de la Chapelle.  
Bus lines 65, 153, 252,302,350, N43-143. PC 3: Arrêt Porte de la Chapelle.



This is a new Paris facility for us which looks impressive and which we hope will serve us well. Each delegate will have their own computer with SenPAQ and XLSTAT installed, so no need to bring your laptop unless you prefer to work on your own machine.

## Pricing and Fees\*

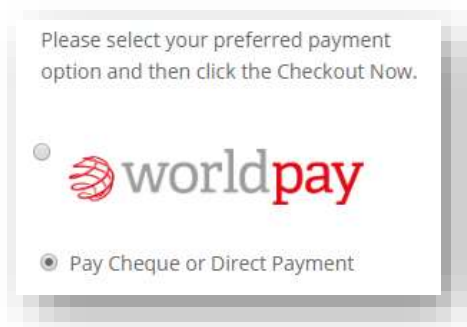
Registration Fee - Course Attendance	£2165
XLSTAT Base + Sensory Module (1 year licence- commercial)	£385
XLSTAT Base + Sensory Module (Perpetual licence including 1 year support/maintenance- commercial)	£1200

\*Payment may be made in £, \$ or Eu. The current exchange rate will be applied at the time of payment.

- Course fees reduced by 10% for members of academia
- Fees include folder of course material, fully licensed copy of SenPAQ, lunch each day and an optional course dinner.
- Discounts: We offer a 10% discount on registrations when two or more people from the same company register for the same course at the same time.

Book online from this link: <https://www.qistatistics.co.uk/upcoming-training/qi-hal-macfie-courses>

\*To make a payment in \$ or Eu please choose the 'pay cheque or direct payment' option on the booking page after adding the items to your basket and we will be in touch to take your payment, but your booking will still be registered in the booking system.



## Detailed Course Content

### Day 1: Univariate Analysis of Sensory Profile Data

The first day focuses on the techniques which consider sensory attributes one at a time. We start with mixed model analysis of variance to test for differences in product mean scores in replicated sensory panel tests and discuss the two sources of "noise" variation in panel data – the assessor by sample interaction and the assessor replication variation. The simplification of the model for unreplicated tests is discussed and used as a trick to simplify mixed model analysis. We then look at how ANOVA can be used to investigate panel performance and discuss the MAM model for investigating panel scaling effects, reviewing panel performance

analysis using SenPAQ, XLSTAT, EyeOpenR and Panel Check .. The day then continues with an overview of discrimination and similarity tests, designing and analysing discrimination tests, the problems of testing for similarity. Measuring difference using proportion of discriminators and Thurstonian  $d'$ . The importance of confidence intervals. Triangle, Tetrad and A-Not A Tests and finishes with analysis of data collected as ranks rather than scaled scores.

**Deliverables:** Testing for product differences in replicated tests using mixed model analysis of variance, multiple comparison tests. Understanding panel performance metrics (discrimination, consistency, repeatability) and summarising them to detect poorly performing assessors. Design and analysis of discrimination and similarity tests, Thurstonian  $d'$ . Friedman's test for rank data

### Day 2: Multivariate Analysis of Sensory Profile Data

Today we look at the various mapping techniques which can be used to visualise product differences using product scores for many variables in the profile simultaneously. Principal Component Analysis (PCA) is explained graphically, focussing on the interpretation of the plots. The difference between covariance and correlation-based analysis is covered, component rotation and the useful option in XLSTAT to superimpose supplementary variables or products on the maps. Clustering of products and variables is outlined both as a method in itself but additionally as a validation of the low dimensional PCA solution. In the afternoon we introduce Multiple Factor Analysis (MFA) as a useful method for investigating relationships between different tables of data (eg: sensory/instrumental/hedonic or napping data), interpretation of RV coefficients. Canonical Variates (CVA) is outlined as an alternative to PCA, together with insights into panel performance. The day finishes with analysis of sorting trials using Multi-Dimensional Scaling (MDS) and cluster analysis

**Deliverables:** Understanding and interpretation of Principal Component Analysis (PCA). Canonical Variates Analysis (CVA) as an alternative approach- . Cluster analysis to identify product groupings and as a technique to visualise results from sorting tasks. Multiple Factor Analysis (MFA) as a technique to inter-relate several tables of data. How to decide which technique is most appropriate for your analysis.

### Day 3: Relating Sensory to Instrumental, Liking and Emotions Data

We start with a refresher on simple linear regression modelling, extending to multiple regression with selection of variables. Outlining the problems of using regression with our typical data where only a limited number of products leads to principal component regression and Partial Least Squares (PLS). In the afternoon we consider temporal methods of data collection: repeated measures analysis of variance and mapping using

three way PCA and PLS, Design and analysis of shelf life studies, comparison of Time Intensity, Temporal Dominance and the more recent TCATA methodology

**Deliverables:** Classical regression, principal components regression, partial least squares (PLS). Repeated measures ANOVA and mapping, shelf life design and analysis, time intensity, TDS and TCATA.

IMPORTANT NOTES:

**Registration Policy:** Registration is not final until payment is received. Unpaid spaces will be opened to new registrants 30 days ahead of the course. Virtual attendees must register and make payment at least 30 days before the start of the course to secure a virtual seat.

**Payment:** Payment may be made in, Euros, GB pounds or US Dollars via the Qi Statistics website or by transfer into Qi Statistics' currency accounts. Contact the course administrator Karen Starke : karen@qistatistics.co.uk for routing and IBAN details of the currency account you require.

**Refund policy:** Cancellation of registration can be made up to 30 days ahead, and return of payments, minus reasonable administrative expenses, will be made for these cancellations. Cancellations within 15 to 30 days of the course start will receive a credit for a future course. Registrants who fail to attend or cancel less than 15 days prior to the seminar start date are responsible for the entire fee. Substitution of another person for the same course may be made at any time.

**Course Cancellation:** Qi Statistics Ltd retains the right to cancel the course 30 days before the start date if less than 4 delegates have registered by that date.

**For further information or questions contact:**  
Qi Statistics Ltd at [www.qistatistics.co.uk](http://www.qistatistics.co.uk) or telephone +44 (0)1189 345722