



Tomato 2001 Data

Consumer Segmentation And Key Drivers Workshop

Application Of Latent Class Regression Modelling



Sensometrics 2004
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Tomato 2001 Data

Tomato 2001 Consumer Study

- **17 Tomato varieties**
- **379 Consumers across 3 regions in France**
- **Each consumer rated liking for 10 out of 17 varieties**
- **Best and least-liked varieties were reassessed later as a paired comparison for consistency of preference and reasons for preference**
- **Same set of tomatoes were assessed by an expert quantitative descriptive sensory panel (11 attributes)**



Tomato 2001 Data

Technical Challenges

- **Consumers have different patterns of preference**
- **Consumers have different levels of discrimination**
- **Individual consumer liking ratings are ‘weak’**
- **Each consumer rated only a subset of all products**

But we need an analysis and interpretation that is:

- **Efficient**
- **Robust**
- **Clear**
- **Actionable**



Tomato 2001 Data

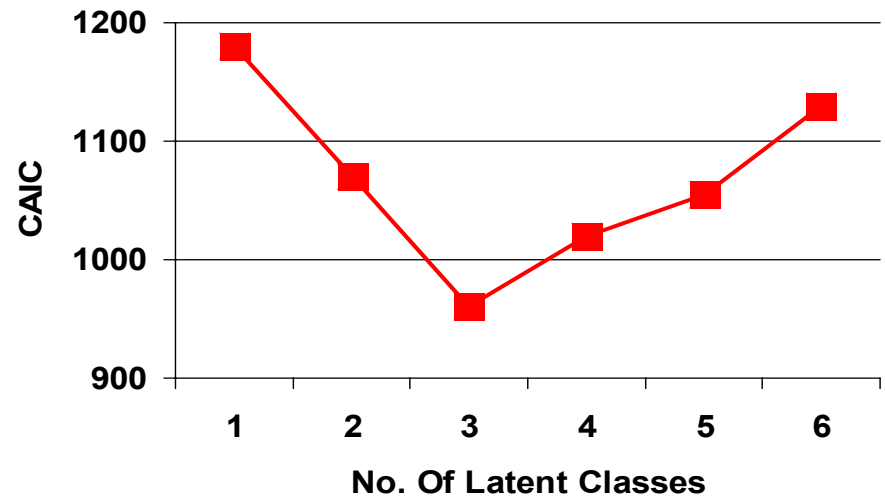
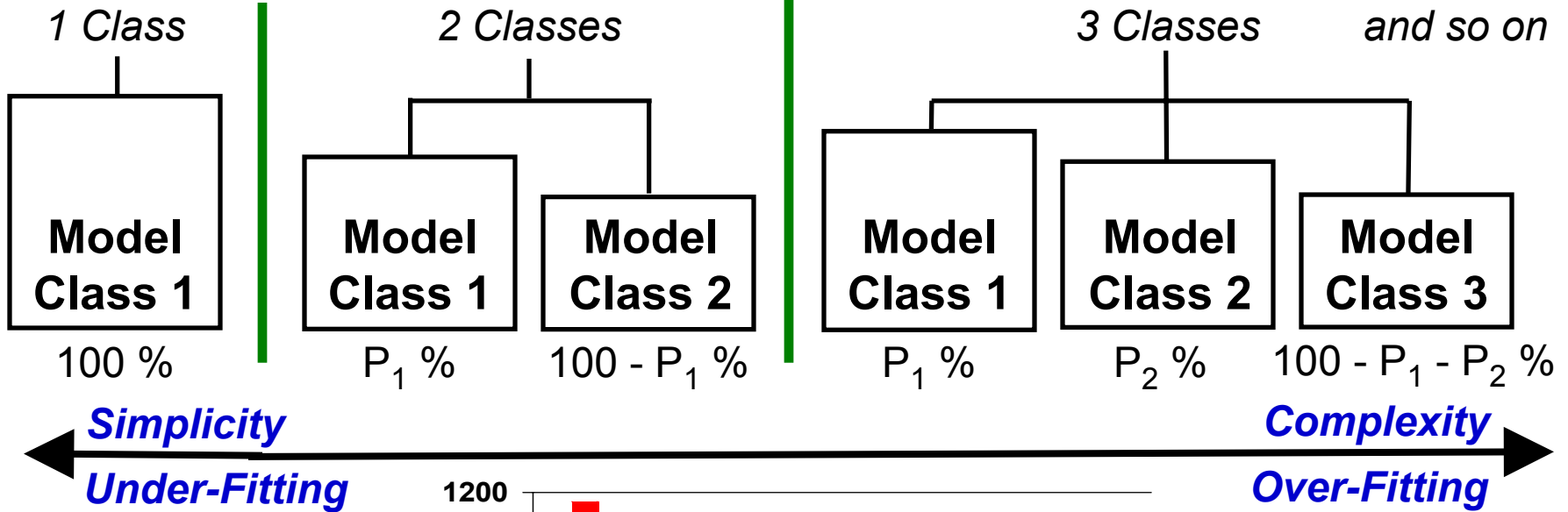
Latent Class Regression Main Features

- **Simultaneous modelling and clustering**
- **Models directly at the (underlying) class level**
- **Uses sensory map or formulation as framework**
- **Flexible system for modelling**
eg Extended model for 'random-scoring' class
- **Provides guidance on appropriate complexity of model to protect against under- or over-fitting**
- **Estimates posterior probability for each respondent belonging to each of the classes**



Latent Class Regression Simultaneous Modelling & Segmentation

Tomato 2001 Data





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Latent Class Segmentation Model Selection

| Criterion | Alternatives | | | | | | | |
|---------------------------|--------------|---|---|---|-----------|---|---|---|
| No. Of Sensory Dimensions | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Model Complexity | Linear | | | | Quadratic | | | |
| Model Format | Standard | | | | Extended | | | |
| No. Of Segments | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |



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Latent Class Segmentation Extended Model

379 Consumers

*Latent Class Regression
Extended Model*

'Random Scoring'

Class 1

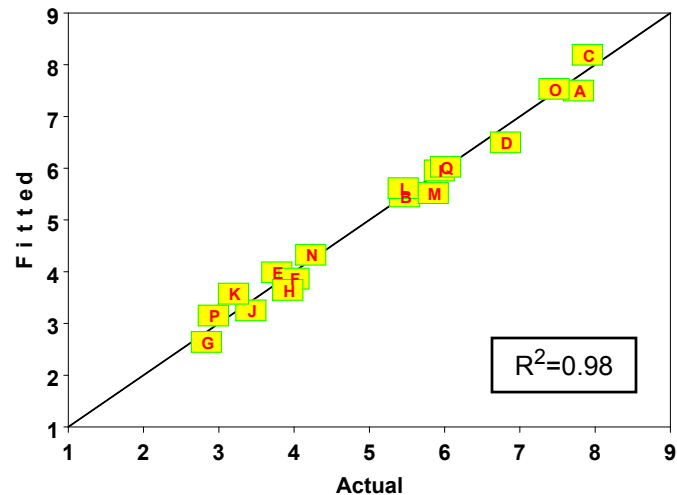
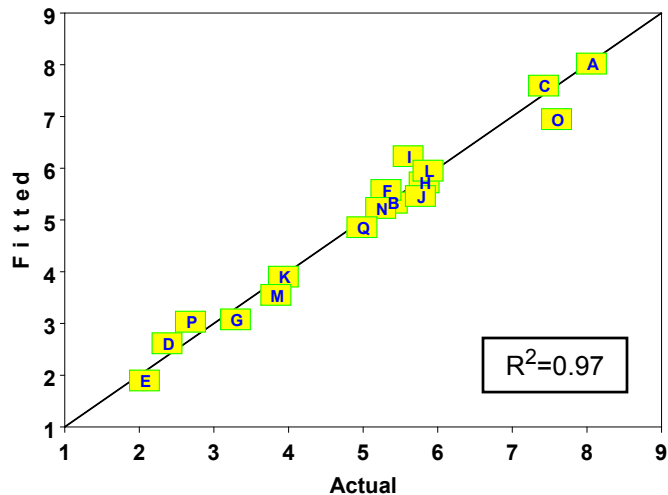
49%

Class 2

31%

Class 3

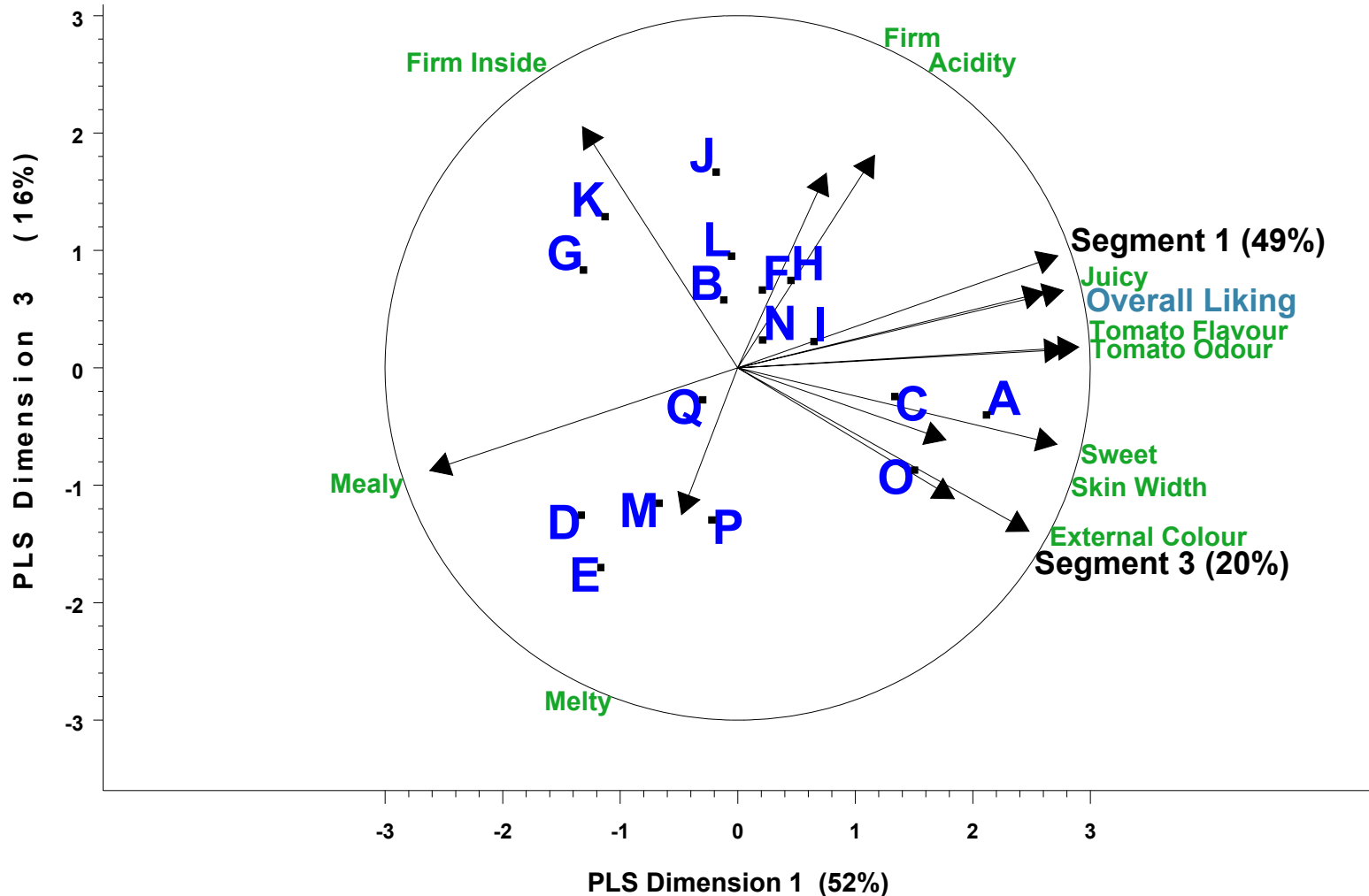
20%





Model For Discriminating Segments

Selected Sensory Dimensions





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Sensory Drivers Of Consumer Liking In Each Discriminating Segment

Segment 1

Common To
Segments 1 & 3

Segment 3

***Positive
Drivers***

Acidity

Sweetness
Tomato Flavour
Juiciness
External Colour
Tomato Odour

Melty

***Negative
Drivers***

Mealy

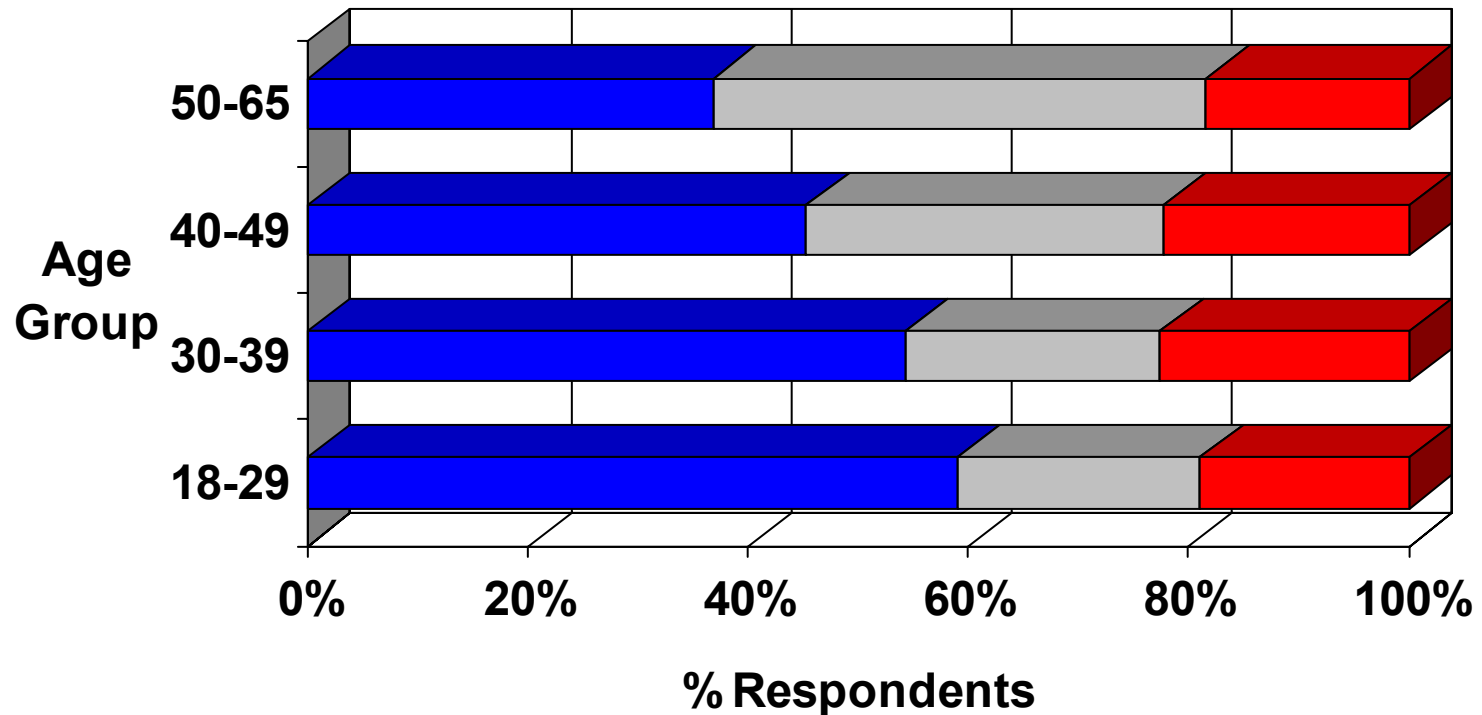
None

Firmness Inside



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Consumer Segmentation In Relation To Age

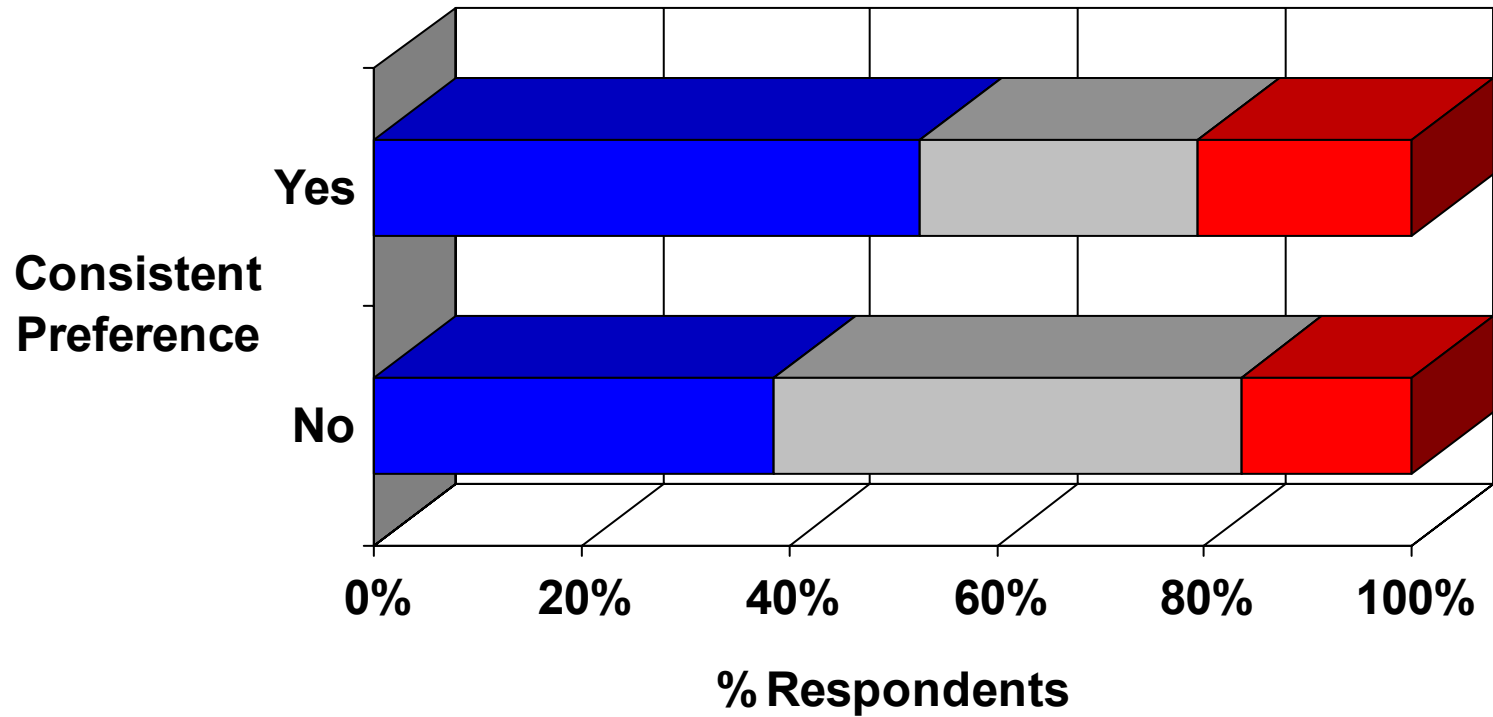


■ Seg 1 ('Acidity') ■ Seg 2 ('Random') ■ Seg 3 ('Melty')



Tomato 2001 Data

Consumer Segmentation vs Consistency Of Preference



■ Seg 1 ('Acidity') ■ Seg 2 ('Random') ■ Seg 3 ('Melty')



Latent Class Regression Summary Table

| <i>Tomato 2001 Data</i> | Segment 1 | Segment 2 'Random Scoring' | Segment 3 |
|--|--|-------------------------------|--|
| Size Of Segment (%) | 49 % | 31 % | 20 % |
| Tomato Varieties Liked Most | A O C L H | | C A O D Q |
| Tomato Varieties Liked Least | M G P D | | E J K P G |
| Positive Sensory Drivers Of Liking | Juicy Tomato Flavour Tomato Odour Sweet External Colour Acidity Skin Width | | Sweet Tomato Flavour External Colour Melly Juicy |
| Negative Sensory Drivers Of Liking | Mealy | | Firmness Inside |
| Key Demographic Attitudinal And Usage Characteristics | ↓ With Age | ↑ With Age | |
| | ↑ With Consistent Preference | ↓ With Consistent Preference | |



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References

Latent Class Regression:

Wedel, M. & Kamakura, W.

Market Segmentation: Conceptual and Methodological Foundations

Kluwer (1999)

Extended Model:

Cleaver, G. J. & Wedel, M.

Identifying random-scoring respondents in sensory research using finite mixture regression models

Food Quality & Preference 12 (2001) 373-384