SOCIETY OF SENSORY PROFESSIONALS
SSP 4th Technical and Professional Conference
September 17–19, 2014
Hilton El Conquistador • Tucson, Arizona, U.S.A.

Combining highly efficient methods can reduce costs without compromise

Chris Findlay[1], John Castura[1], Paul McNicholas [2] and Ryan Browne [2]

[1]Compusense Inc. Guelph, Canada.
[2]Department of Mathematics & Statistics, McMaster University, Hamilton, Canada

Compusense®

How is it that we never have enough time

to do the job right,

but always enough time to do it over?

Objectives

1. Provide an effective strategy for category assessments
2. Reduce large numbers of possible test products
3. Understand the product sensory space

Objectives

4. Design highly efficient consumer studies
5. Combined methods
6. Deliver reliable and robust outcomes

The Methods

1. Projective Mapping (Napping)
2. Calibrated Descriptive Analysis (FCM)
3. Sensory Informed Design

The Methods

4. E-M Imputation of Missing Data
5. Cluster Analysis on Consumer Liking
6. Correlation of Sensory and Consumer Data

Projective Mapping

White bread candidates

35 products

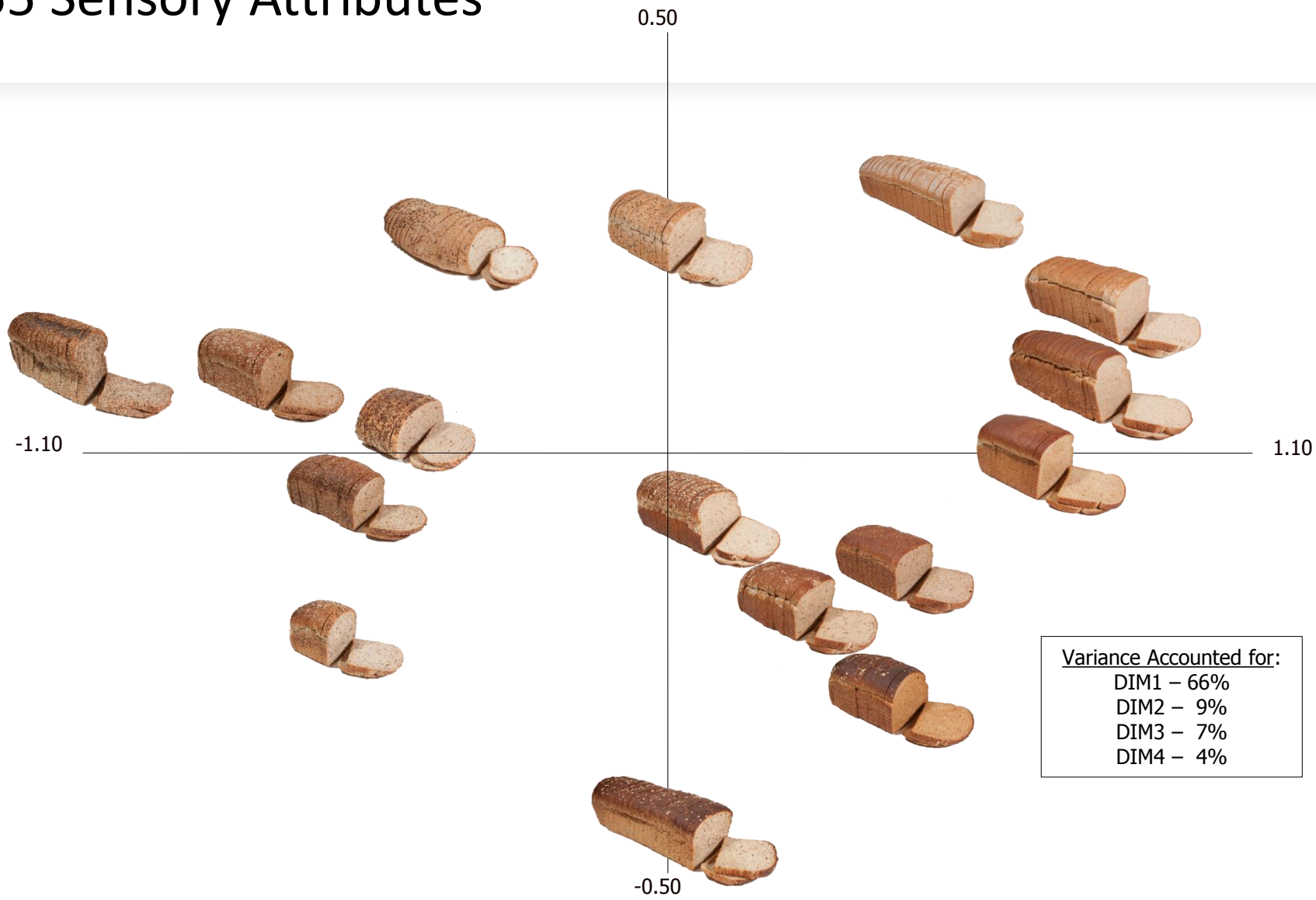
to a set of 12

Projective Mapping

Whole grain breads

50 products
to a set of 16

GPA of 16 Whole Grain Breads
55 Sensory Attributes

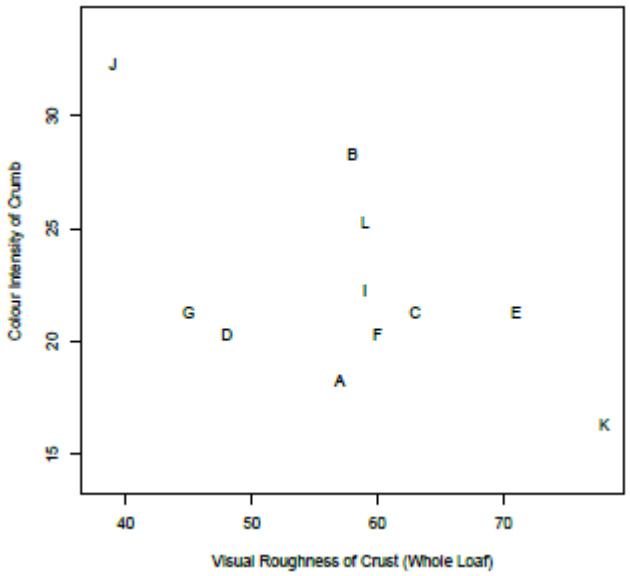


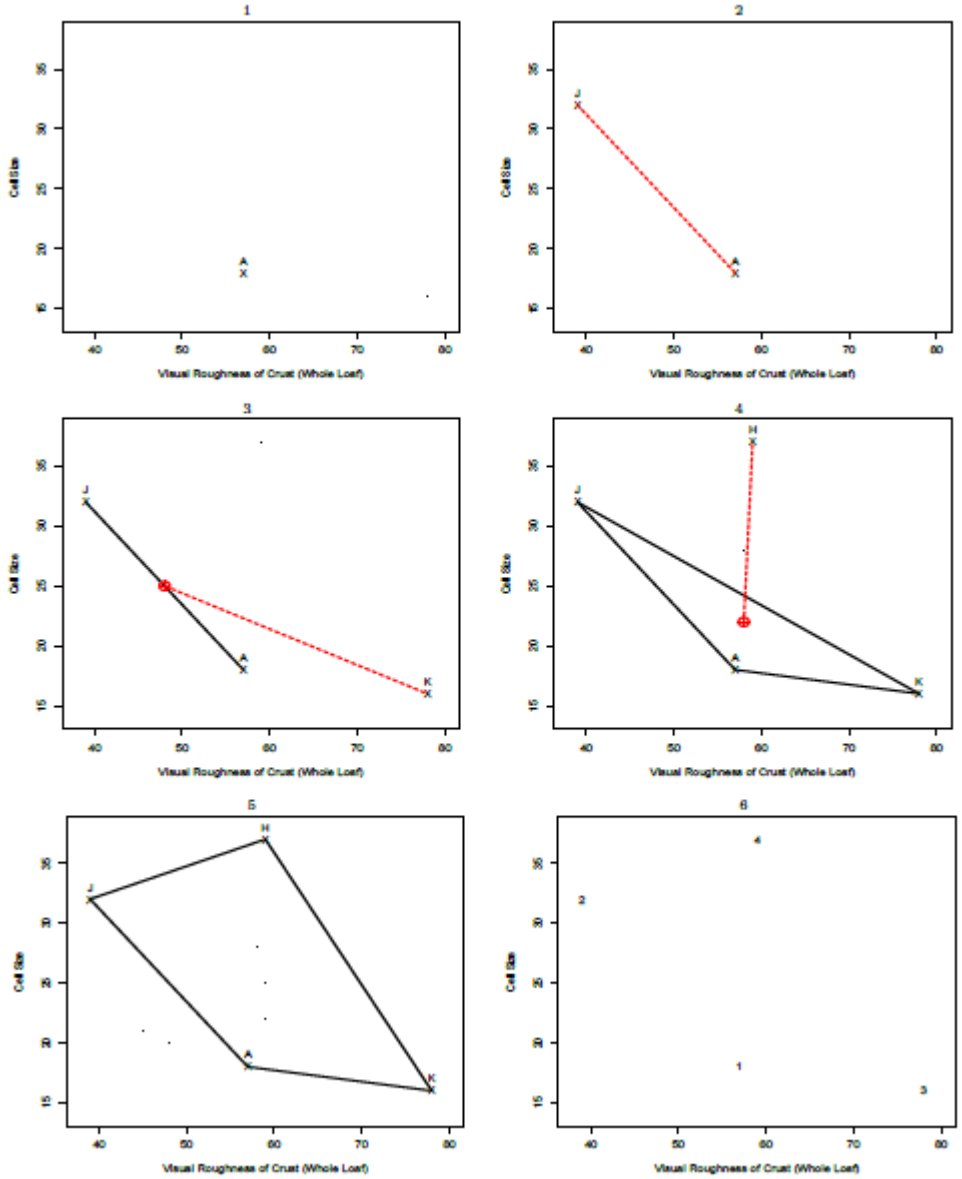
Sensory Informed
Balanced Incomplete Block Design (SID)

Sample sets that

- maximize sensory contrast
- ensure consumer liking
- results reflect consumer sensory preference

SID Procedure





SID Consumer Studies

White Bread

Nested designs

- 12 present 3
- 12 present 4
- 400 consumers
- 6 products for liking

SID Consumer Studies

Whole Grain Bread

Nested design

16 present 3

16 present 4

570 consumers

6 products for liking

E-M Imputation of Missing Data

The Role of Imputation in Clustering BIB Data

Ryan Browne, Brian Franczak, Paul McNicholas and Chris Findlay

(2014) Sensometrics Workshop 2014, Chicago, USA

This workshop provided a step-by-step process for handling missing data that was systematically absent through SID.

Code in the R-language was made available to permit anyone to apply the procedure to their own data.

PGMMImputation package (Franczak et al., 2014) for R (R Core Team, 2014)

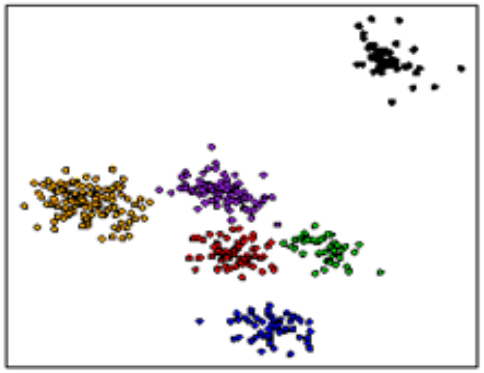
White Bread Study: Results

- Consumer data was collected
- Missing data was imputed
- EM approach for mixture model-based clustering

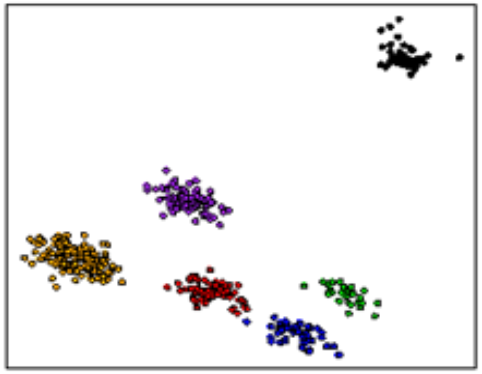
- The scatter plots demonstrate
- stability of the clusters
- For all three partially presented blocks

White Bread Study: Results

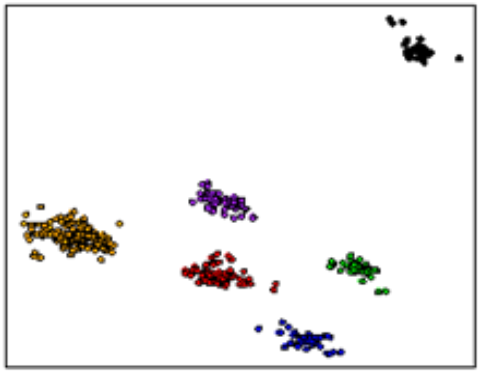
White Bread Consumer Cluster Analysis (n=400)



SID of 12 present 6



SID of 12 present 4



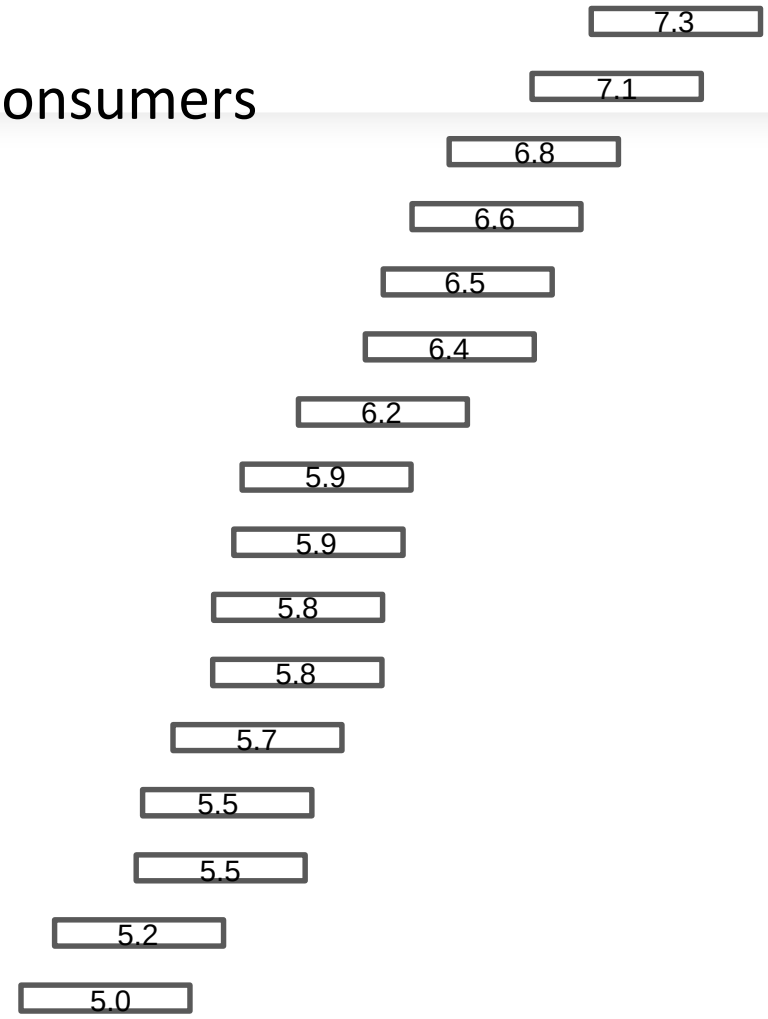
SID of 12 present 3

Whole grain breads

Overall Liking
All 570 Category Consumers

☺ LOVE IT!

☹ HATE IT!

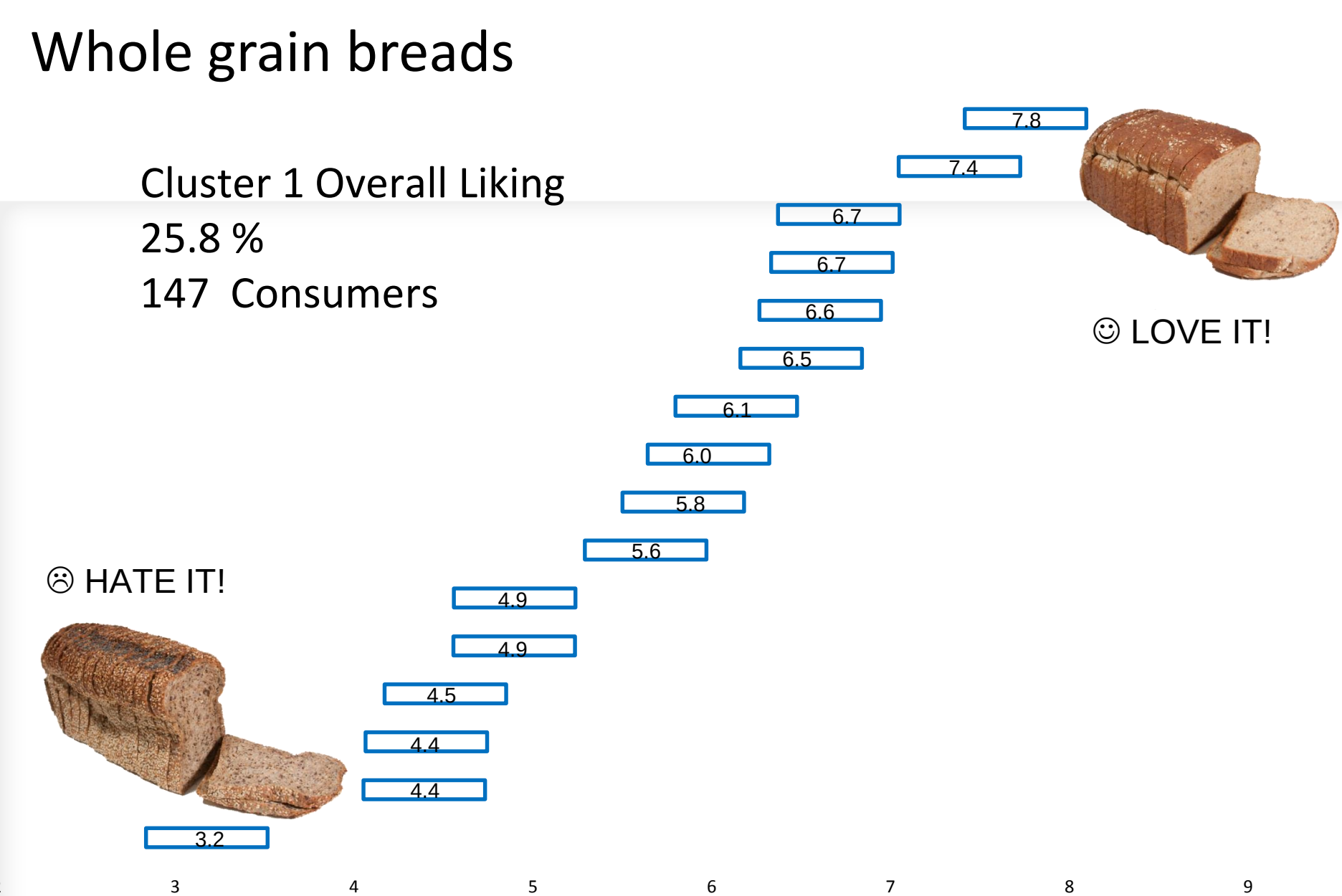


Whole grain breads

Cluster 1 Overall Liking
25.8 %
147 Consumers

☺ LOVE IT!

☹ HATE IT!



Whole grain breads

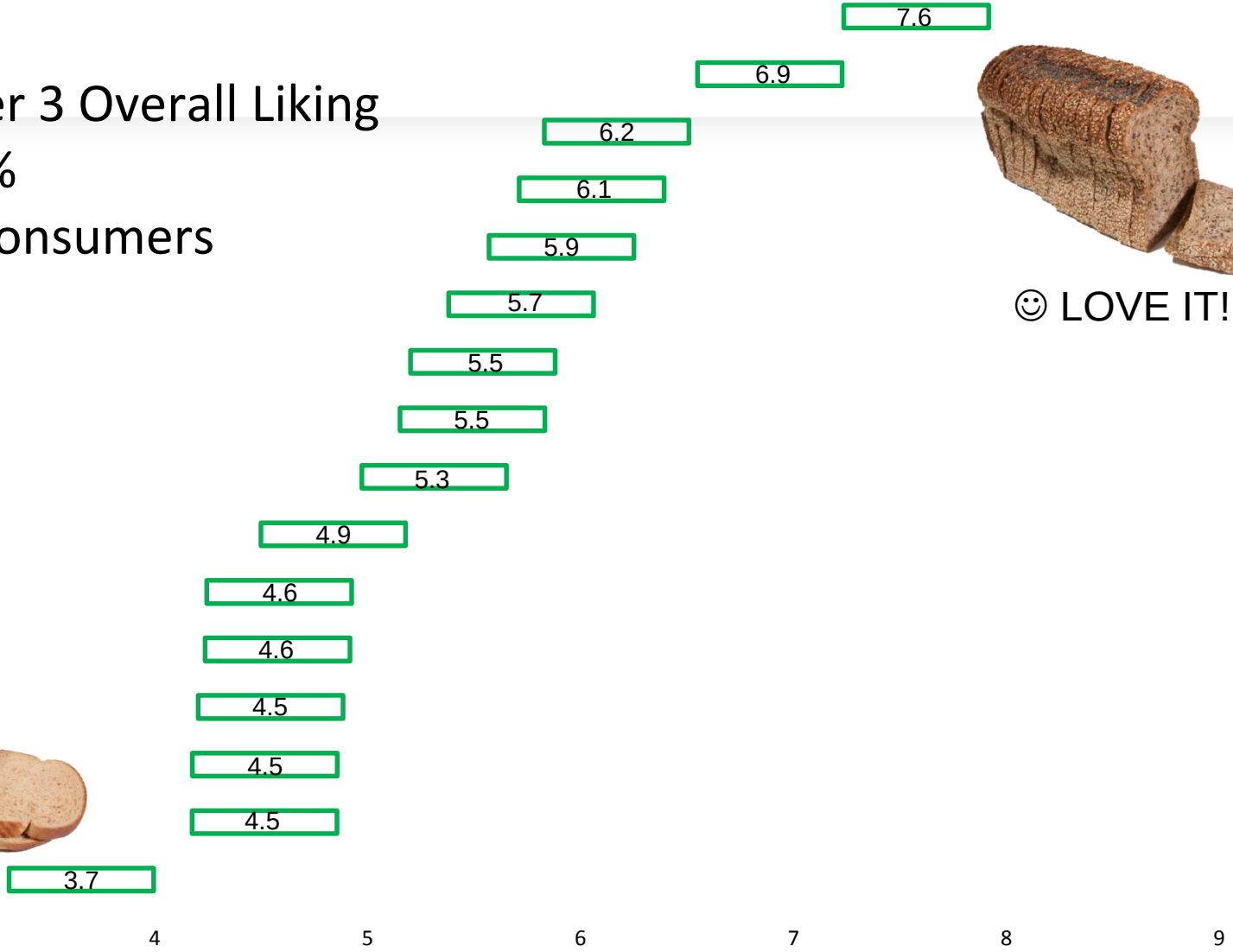
Cluster 2 Overall Liking
45.3 %
258 Consumers

Whole grain breads

Cluster 3 Overall Liking
28.9 %
165 Consumers

☺ LOVE IT!

☹ HATE IT!



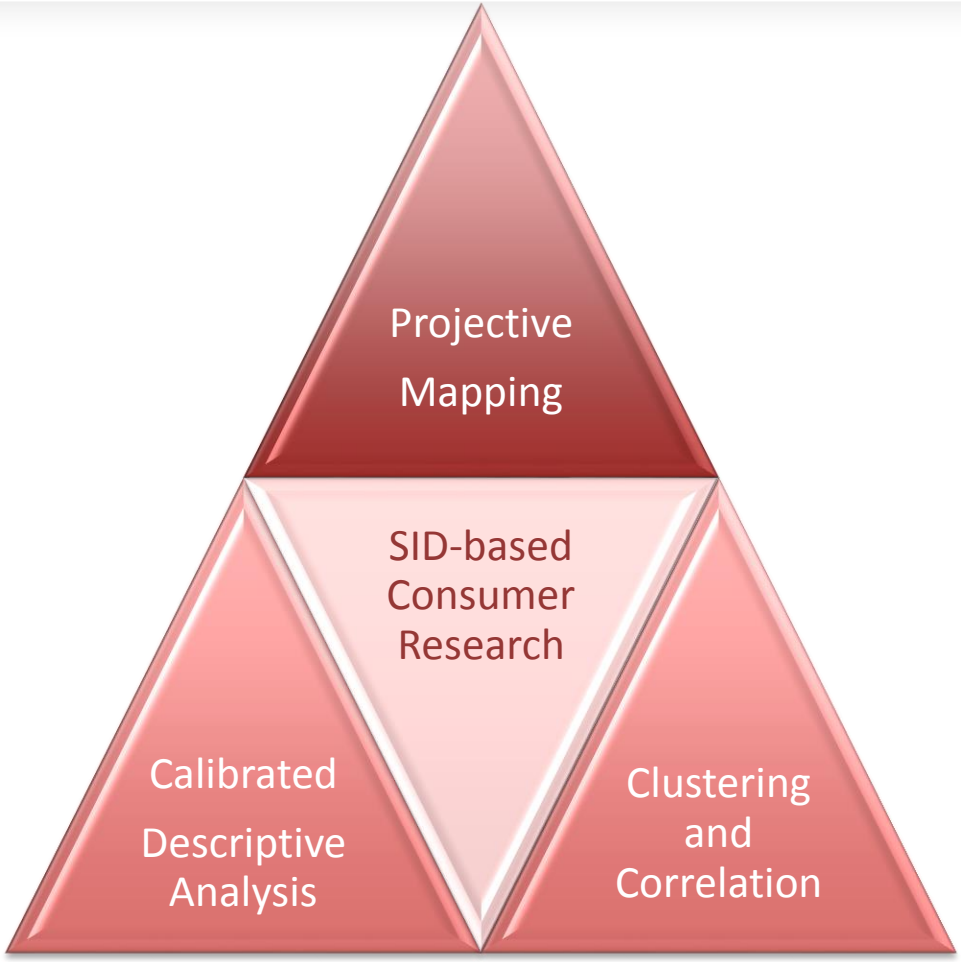
Conclusions

- Projective Mapping
  - efficient
  - selects a representative sensory product set.
- FCM trained DA panel
  - less than half the time
  - greater precision.

Conclusions

- SID consumer research
  - Eliminates fatigue or boredom
  - provides a solid basis for consumer segmentation.
- EM Imputation
  - realistic values for the missing data
  - integrates with clustering to identify liking segments.

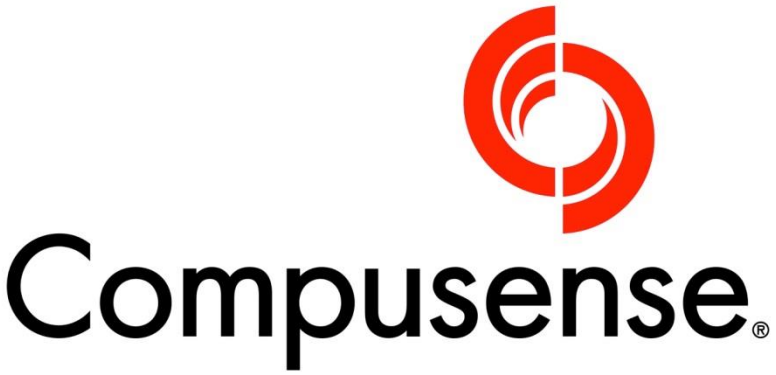
Putting it all together



References

- Browne, R. P., Findlay, C.J. McNicholas, P.D., Castura, J.C. (2012). Sensory Informed Incomplete Block Design. Sensometrics 2012, Rennes, France.
- Browne, R. P., McNicholas, P.D. and Findlay, C.J. (2013). A partial EM algorithm for clustering white breads. arXiv:1302.6625.
- Browne, R. P., Findlay, C.J. McNicholas, P.D., Castura, J.C. (2013). Sensory informed design: An effective clustering of incomplete block consumer data. Pangborn 2013 Symposium, Rio de Janiero, Brazil.
- Findlay, C.J., Castura, J.C., Lesschaeve, I. (2007). Feedback Calibration: a training method for descriptive panels. Food Quality & Preference 18(2): 321-328
- Franczak, B.C., Browne, R, P., McNicholas, P.D., Findlay, C.J. (2014) Product Selection for Liking Studies: The Sensory Informed Design, Food Quality and Preference (submitted)
- Lawless, H.T. & Heymann, H. G. 2010. Sensory Evaluation of Food. Springer. New York

Thank You



compusense.com

+1 519 836 9993 – Worldwide

1 800 367 6666 – Toll free in North America

info@compusense.com