

# THE APPLICATION OF CHECK-ALL-THAT-APPLY (CATA) CONSUMER PROFILING TO PREFERENCE MAPPING OF VANILLA ICE CREAM AND ITS COMPARISON TO CLASSICAL EXTERNAL PREFERENCE MAPPING

Youngseung Lee, Lauren Dooley &  
Jean-François Meullenet

# Introduction

Quantitative  
consumer  
research is a key  
tool in R&D



Overall consumer  
impression of  
products usually  
quantified on  
hedonic scale

- Hedonic ratings only because consumers cannot explain what they like
- Others have consumers rate specific attributes for intensity or appropriateness



Intensity or  
appropriateness  
ratings used to  
explain consumer  
hedonic ratings

# Introduction

Ballots with intensity ratings can become very cumbersome when many products are evaluated

Intensity scaling can be a difficult concept for consumers

Intensity or appropriateness questions can have impact on hedonic ratings

# Introduction

CATA is a compromise  
between only liking and  
asking intensity ratings

Check **all attributes** that describe this sample:

- |  |   |
|--|---|
| <input type="checkbox"/> Buttery                       | <input checked="" type="checkbox"/> Soft          |
| <input checked="" type="checkbox"/> Sweet              | <input type="checkbox"/> Hard                     |
| <input type="checkbox"/> Milk/dairy flavor             | <input checked="" type="checkbox"/> Gummy         |
| <input type="checkbox"/> Custard/eggy flavor           | <input type="checkbox"/> Icy                      |
| <input type="checkbox"/> Corn Syrup                    | <input checked="" type="checkbox"/> Creamy/Smooth |
| <input checked="" type="checkbox"/> Artificial vanilla |   |
| <input type="checkbox"/> Natural vanilla               |   |
| <input type="checkbox"/> Creamy Flavor                 |   |

# Previous CATA research

**Advantages and uses of check-all-that-apply response compared to traditional scaling of attributes for salty snacks**

J. Adams, A. Williams, B. Lancaster, M. Foley; *Frito Lay*, USA  
Rose Marie Pangborn  
Sensory Science Symposium, 2007

Type of methodology allowing a more instinctive description of the main sensory properties of the product tested

Type of question which can be about attributes, product usage or concept fit

Product Attributes	Concept Deliverables	Occasion/Use
Sweet	Indulgent	As a meal
Salty	Energizing	As a snack
Creamy	Comforting	While driving
Soft	Artificial	Watching TV
Tough	Bland	After exercising

# Objectives

1. to evaluate the use of check-all-that-apply CATA data for the creation of preference maps
2. to compare CATA maps to classical internal and external mapping generated from traditional sensory profiles

# Methods

1. Consumer and Sensory Testing

2. Preference Mapping

3. Comparison of Preference Mapping Outcomes

# Consumer and Sensory Testing




10 commercial vanilla ice cream products retailed in the United States



80 consumers tested products over two sessions



Complete randomized design balanced for presentation order



Consumers answered an overall liking question using the 9-point verbal hedonic scale as well as a check-all-that-apply question with 13 attributes describing the sensory attributes of vanilla ice cream



Products profiled by a trained descriptive panel (17 individuals) according to 23 attributes in two replications



# Vanilla Ice Creams

Brand	Name/Description	Fat Content	Flavor	Manufacturer
Ben & Jerry's	Vanilla	24%	Natural	Ben & Jerry's Homemade Holdings, Inc. (Unilever)
Best Choice	Vanilla	11%	Artificial	Harps Stores Inc.
Blue Bell	Homemade vanilla	13%	Natural & Artificial	Blue Bell Creameries
Blue Bunny	Premium all natural vanilla	10%	Natural & Artificial	Wells' Dairy, Inc.
Breyers	Natural vanilla	12%	Natural	Unilever
Edy's "Grand"	Rich & creamy vanilla	5%	Natural	Nestlé
Great Value	Vanilla	11%	Artificial	Wal-Mart Stores Inc.
Guilt Free	Vanilla	4%	Natural & Artificial	Yarnell Ice Cream Co.
Häagen-Dazs	Vanilla	28%	Natural	Nestlé
Yarnell's	Homemade vanilla	15%	Natural & Artificial	Yarnell Ice Cream Co.

# CATA Question

Check **all attributes** that describe this sample:

- |  |   |
|--|---|
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# Preference Mapping

## Three flavors of preference mapping employed.

- External preference mapping (Danzart, 2004) using the descriptive profiles as basis of the sensory space
- Same as above but CATA attribute counts used to create the sensory space
- Internal map constructed following Euclidian Distance Ideal Point Modelling (Meullenet et al., 2007). Preference space determined from overall liking scores

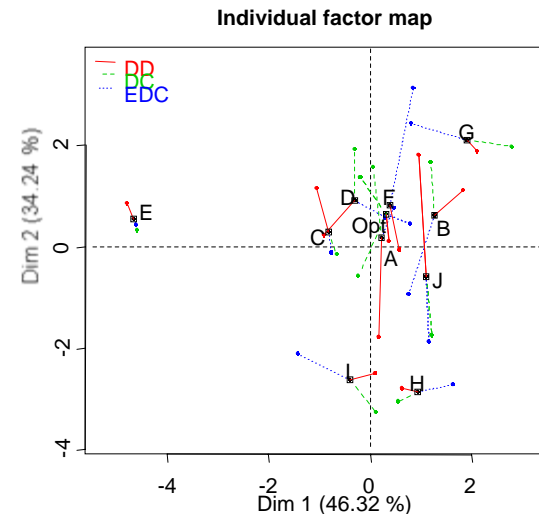
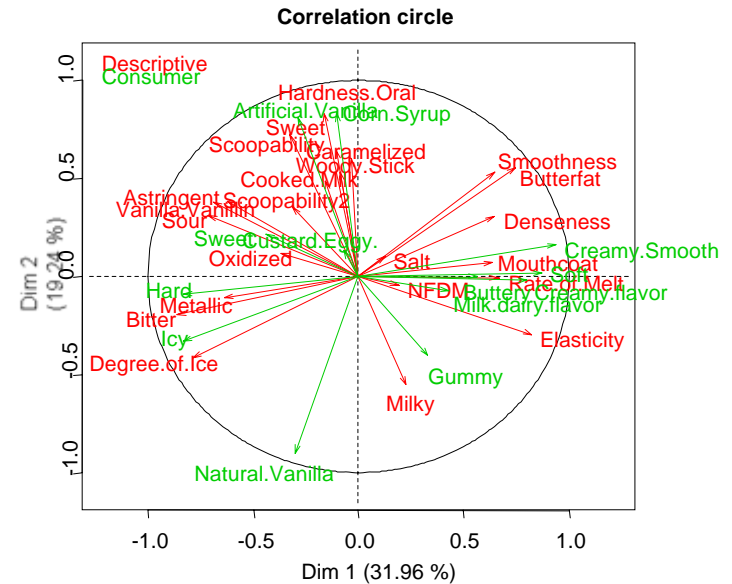
## Group ideals determined for all three methods

- Coordinates in sensory, CATA or preference spaces
- Profiles of ideal points in terms of CATA determined by multiple regression

# Multiple Factor Analysis

The counts for each of the 13 attributes in the check-all-that-apply question were compared to the descriptive profiles via Multiple Factor Analysis (MFA), using FactoMineR in R ©2008, v.2.6.2.

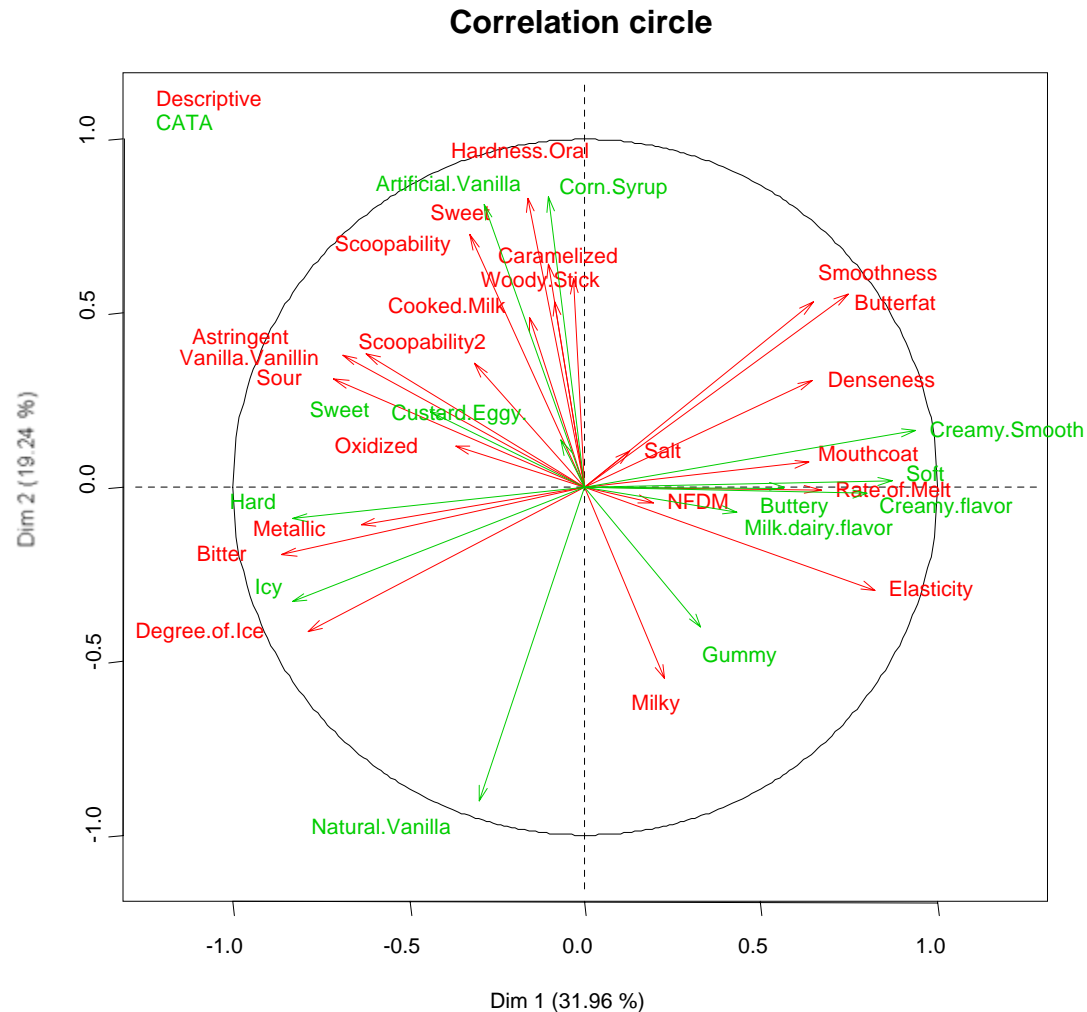
Commercial products and group ideals coordinates on the first 2 dimensions for the three preference maps analyzed for similarity by MFA.



# CATA Counts

Brand	Soft	Hard	Gummy	Icy	Creamy/ Smooth	Buttery	Sweet	Milk/dairy flavor	Custard/ Eggy Flavor	Corn Syrup	Natural Vanilla	Artificial Vanilla	Creamy flavor
Blue Bell	42	20	5	37	31	44	58	60	45	10	25	39	45
Blue Bunny	37	20	7	16	45	46	53	58	35	13	28	33	51
Ben & Jerry's	21	31	7	22	34	29	53	50	28	16	27	29	44
Best Choice	29	29	4	28	37	43	61	62	32	13	34	33	54
Breyers	8	43	7	61	10	17	57	52	25	11	37	37	24
Edy's "Grand"	25	38	4	20	35	39	61	59	26	16	28	43	53
Great Value	51	11	12	8	59	38	46	58	21	12	27	31	52
Guilt Free	34	22	3	29	35	30	52	57	22	23	19	45	35
Häagen-Dazs	17	32	7	14	40	30	61	52	35	21	19	49	43
Yarnell's	43	16	4	14	51	21	60	54	22	15	24	42	47

# MFA of CATA and Descriptive



# CATA based external map

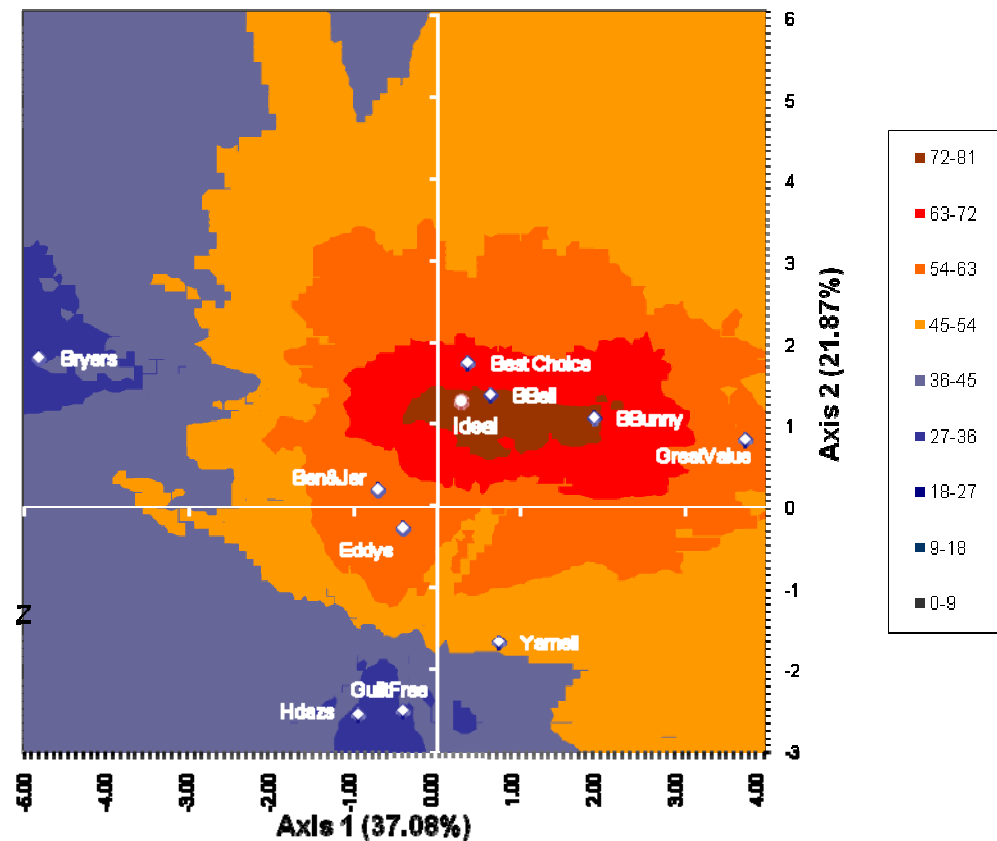
Group Ideal closest  
to products Blue Bell  
and Best Choice



78% of consumers  
satisfied by the Ideal



Average  $R^2$  for  
consumers = 0.61



# Descriptive based external map

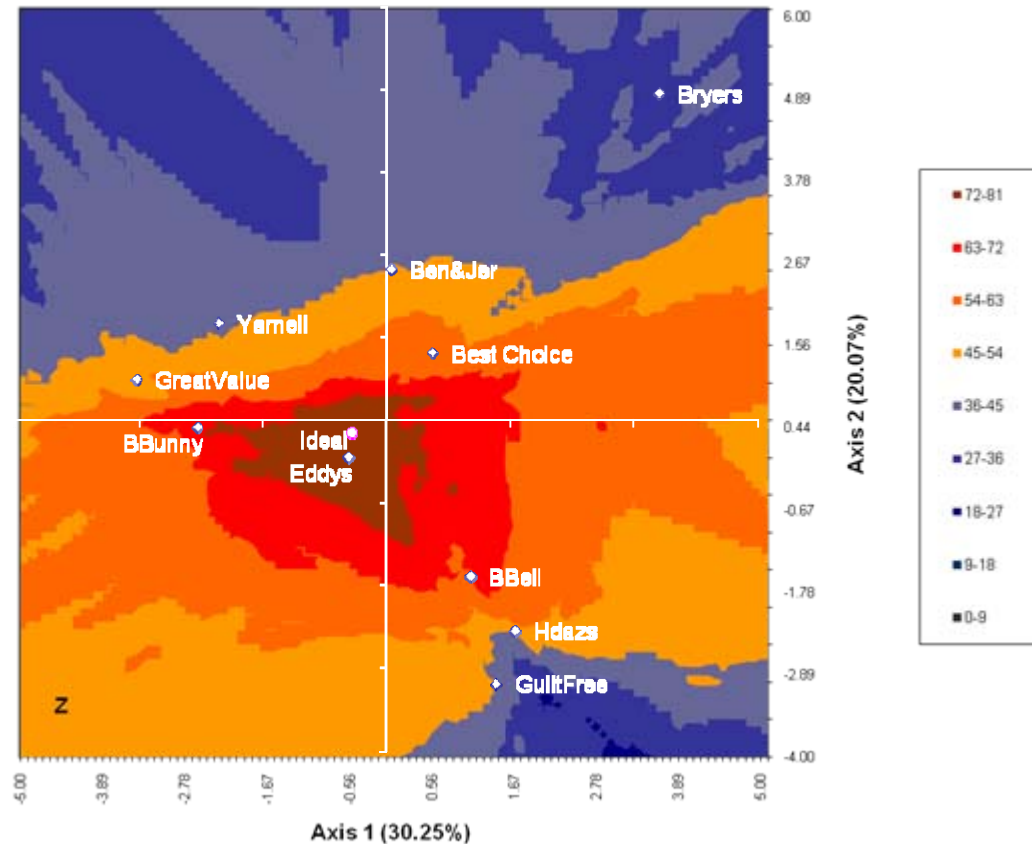
Ideal Point  
closest to Eddy's



Average  
 $R^2=0.59$  for  
consumers

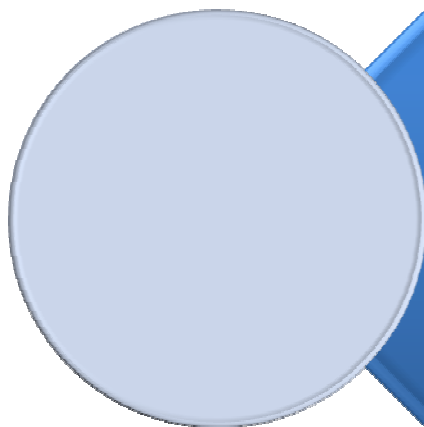


76% of  
consumers  
satisfied by this  
ideal

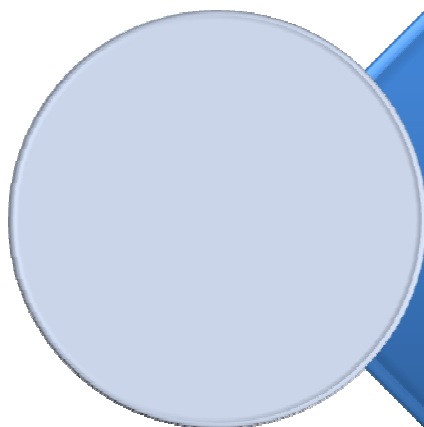




# Modeling Comparison

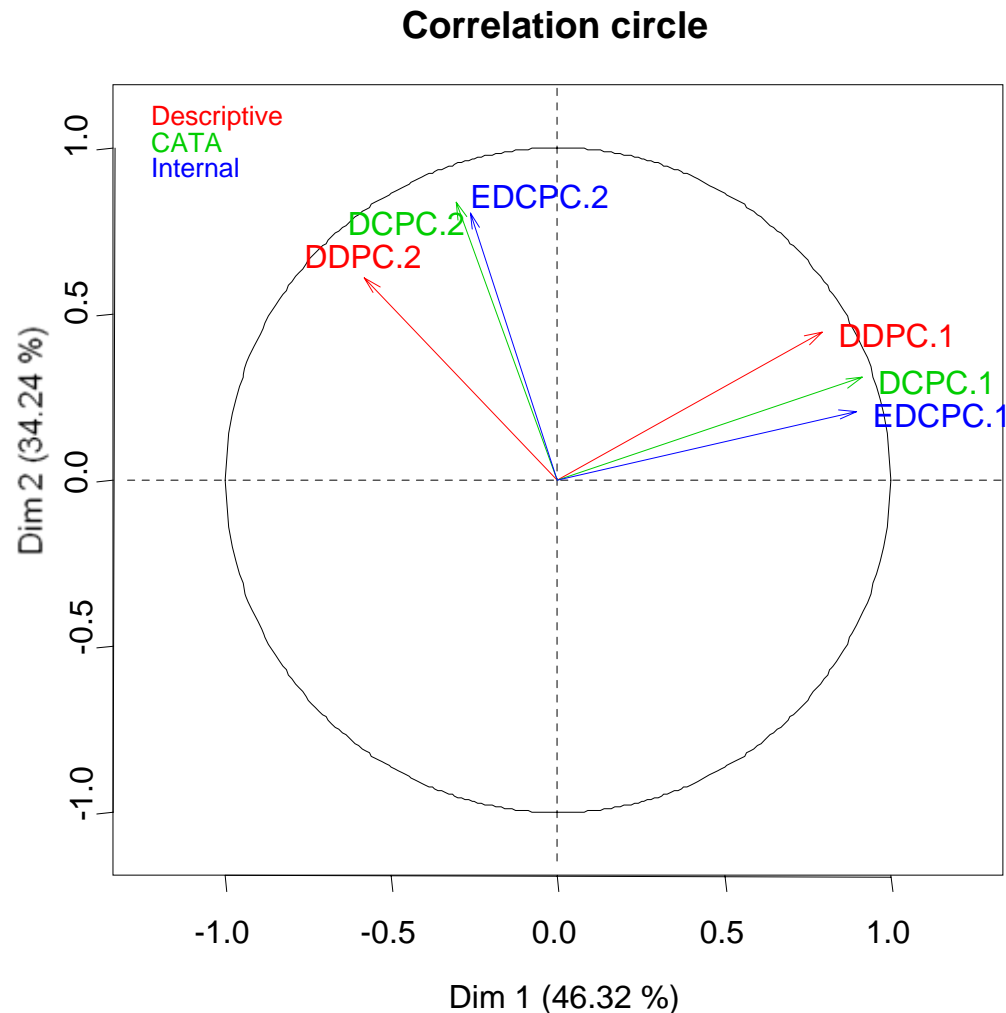


The first 2 dimensions explained a similar amount of the variability (59% CATA vs. 50% DA)



Average consumer fit equivalent for CATA map ( $R^2=0.61$ ) and DA map ( $R^2=0.59$ )

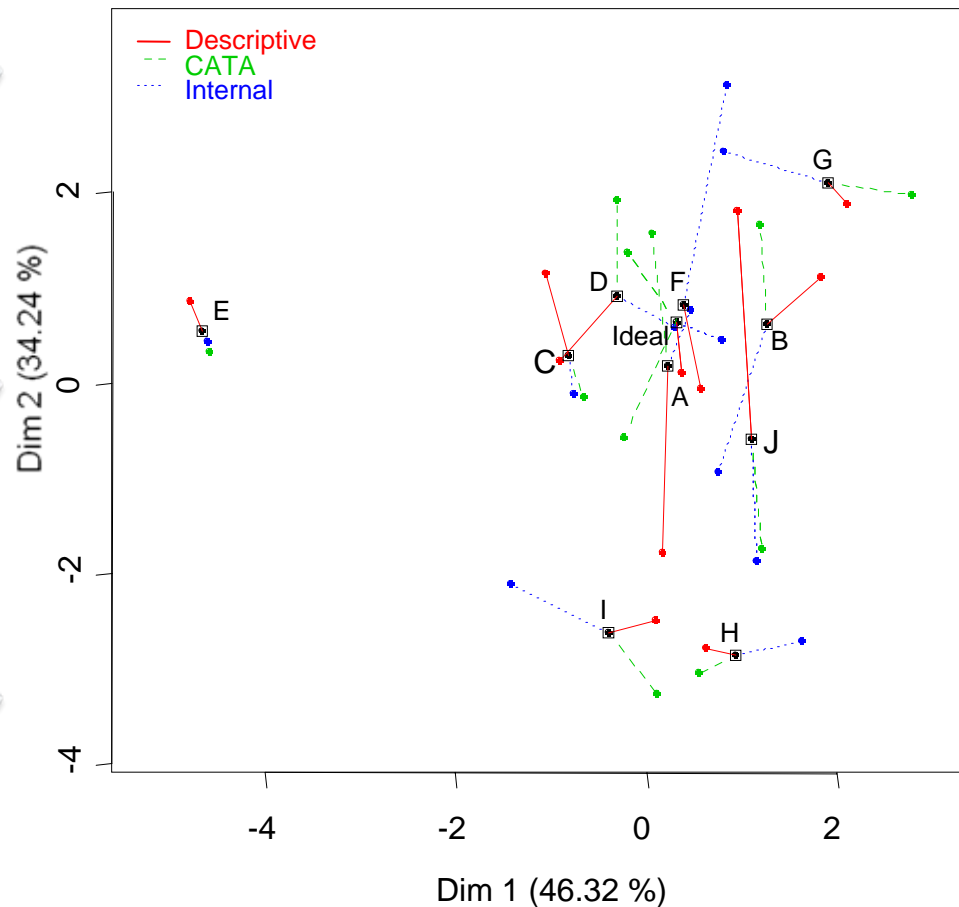
# MFA on product & ideal configurations



# MFA on product & ideal configurations

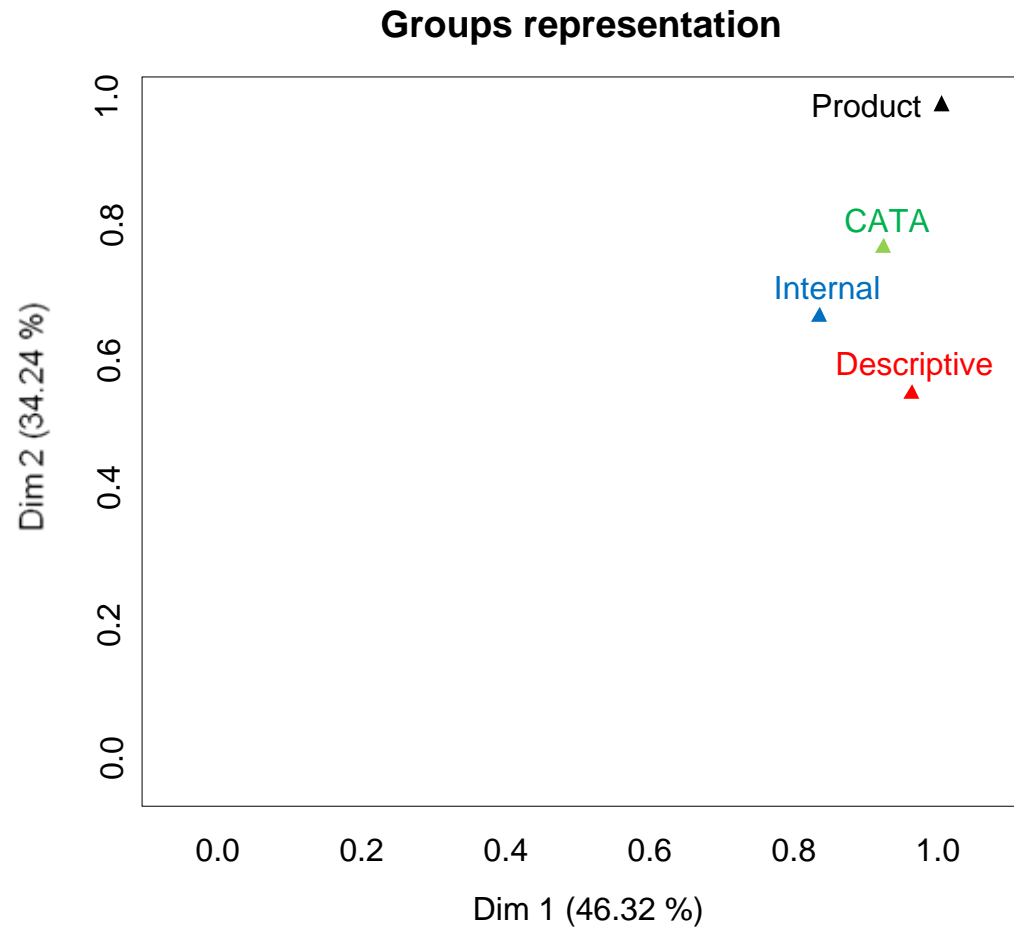


Individual factor map



# MFA on product & ideal configurations

CATA more similar to internal map than to external descriptive map

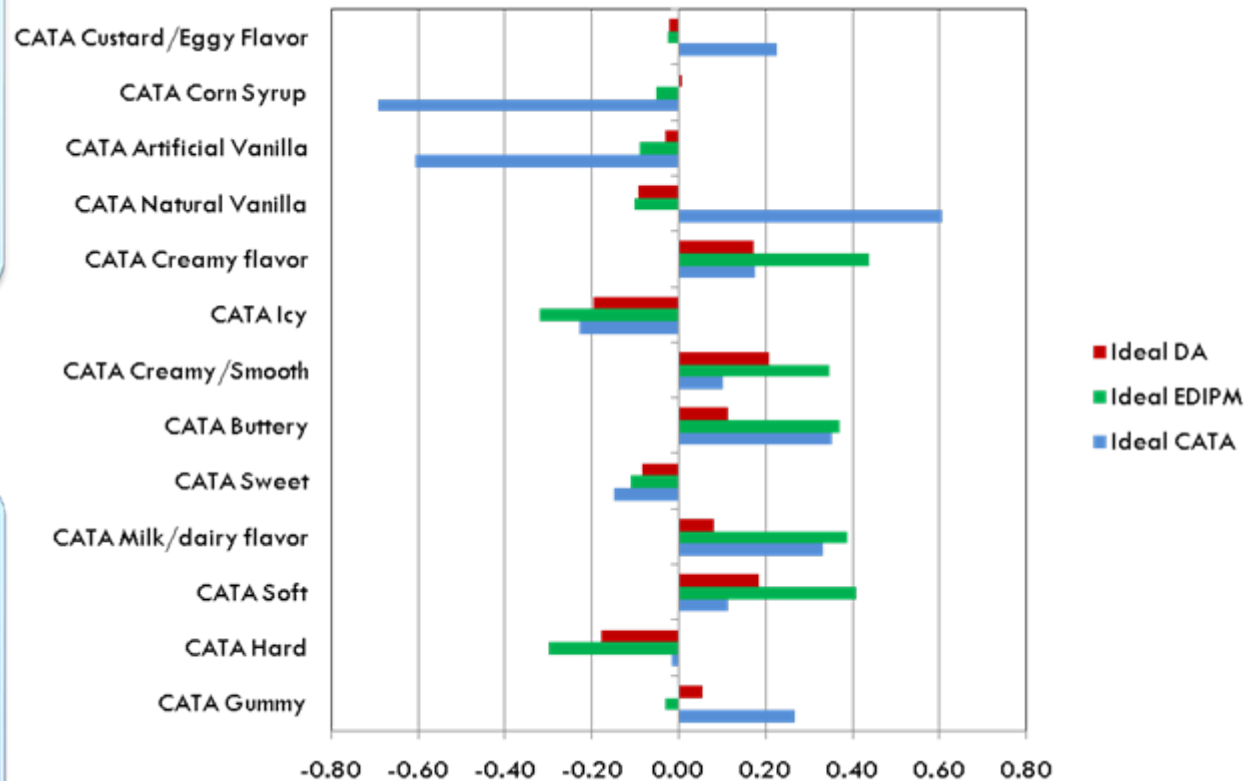


# Ideal CATA Profiles

CATA attributes projected in all 3 spaces and Ideal point normalized CATA determined



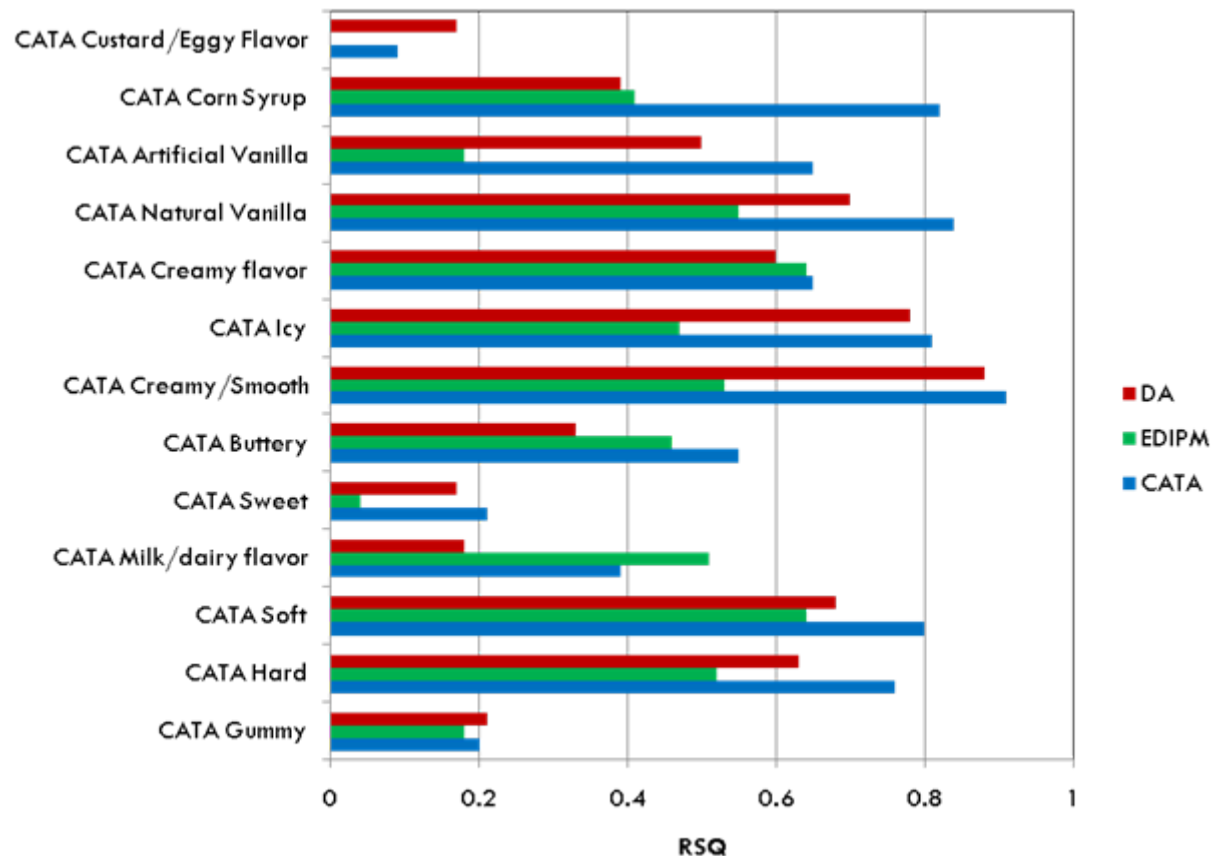
Positive drivers: soft, milky/dairy, buttery, creamy flavor, natural vanilla (CATA space)



# CATA attributes fits in spaces

CATA attributes not as well fitted in preference space (EDIPM)

Most CATA attributes well fitted in sensory space (DA)



# Conclusions

## Overall

- CATA attribute data applied to preference mapping gave similar results to internal and external preference mapping

## Advantage of CATA

- task asked of consumers is simple (i.e., when compared to intensity ratings)
- responses may be more spontaneous than when intensities are rated

## Limitation of CATA

- optimal profile derived from the check-all-that-apply maps is in terms of response counts and not intensities as given by a trained panel

# Future Research

Investigate means of term generation for CATA terms (e.g., qualitative research, focus groups)

Assess the impact of term order and number of terms on frequency counts

Incorporate deliverables and usage terms into mapping techniques