

W1.4

# Temporal check-all-that-apply (TCATA): Overview and recent developments

**John C. Castura**

Compusense Inc.



# What is TCATA?

- Extends CATA to *continuously track sensory properties*
- Builds on earlier non-intensity temporal methods  
(Flavor Profile, Time-Quality Tracking, Temporal Dominance of Sensations, Temporal Order of Sensations, ...)
- Used with *trained panelists or consumers*

# Why use TCATA?

- Perception of sensations during eating and drinking are not static
- Nor are perception of sensations static after application of cosmetic or personal care products
- TCATA can be used to investigate and understand perception dynamics

# Some examples of TCATA applications

- Early-stage formulation/reformulation
  - Explore the temporal evolution of sensations of prototypes and/or of products in the category
- Investigating impact of ingredients/process
  - Designed experiments to investigate how ingredient/process changes affect sensory outcomes
- Product matching
  - Confirm that products have similar perception dynamics after reformulation/process changes
- Product reformulations
  - Confirm that reformulation/process changes have successfully differentiated the product

# TCATA task

**Check and uncheck words** to track changes in the orange juice. At each moment, the words that are **checked** should **describe** the **orange juice** (check *all* that apply, in that moment).



0:00

☐

Astringent

☐

Off Flavor

☐

Sourness

☐

Bitterness

☐

Sweetness

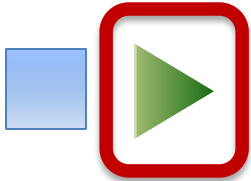
☐

Orange Flavor

# TCATA task

Check and uncheck words to track changes in the orange juice. At each moment, the words that you should describe the orange juice (check all that apply, in that moment).

Timer starts when **Start** button is clicked



0:00

☐

Astringent

☐

Off Flavor

☐

Sourness

☐

Bitterness

☐

Sweetness

☐

Orange Flavor

# TCATA task

Check/uncheck attributes to describe the sample

...in the orange juice. At each moment, the words that are checked should describe the orange juice (check all that apply, in that moment).

☐ ...immediately

☐

Astringent

☐

Off Flavor

☐

Sourness

☐

Bitterness

☐

Sweetness

☐

Orange Flavor

# TCATA task

Check/uncheck attributes to describe the sample...

that moment).



0:15

☐

Astringent

☐

Sourness

☐

Sweetness

☐

Orange Flavor

***or after a waiting  
period***  
(e.g. after swallowing)

# TCATA task

Check and uncheck words to track change in taste perception over time after drinking juice. At each moment, the words that are shown should be checked (or unchecked) that represent the current state.

Instructions related to evaluation protocol could be provided

Swallow the sample now...

☐ Astringent

☐ Off Flavor

☐ Sourness

☐ Bitterness

☐ Sweetness

☐ Orange Flavor

# TCATA task

Check and uncheck words to track changes in the orange juice. At each moment, the words that are **checked** should **describe** the **orange juice** (check *all* that apply, in that moment).



0:45

☐

Astringent

☐

Sourness

☐

Sweetness

☐

Off Flavor

☐

Bitterness

☐

Orange Flavor

Evaluation ends at a set time  
(determined by study objectives)

# TCATA task

**Check and uncheck words** to track changes in the orange juice. At each moment, the words that are **checked** should **describe** the **orange juice** (check *all* that apply, in that moment).



0:00

☐

Astringent

☐

Off Flavor

☐

Sourness

☐

Bitterness

☐

Sweetness

☐

Orange Flavor

# TCATA task

**Check and uncheck words** to track changes in the orange juice. At each moment, the words that are **checked** should **describe** the **orange juice** (check *all* that apply, in that moment).



0:09

☐

Astringent

☐

Off Flavor

☐

Sourness

☐

Bitterness

☐

Sweetness

☒

Orange Flavor

# TCATA task

**Check and uncheck words** to track changes in the orange juice. At each moment, the words that are **checked** should **describe** the **orange juice** (check *all* that apply, in that moment).



0:12

☐

Astringent

☐

Off Flavor

☐

Sourness

☐

Bitterness

☒

Sweetness

☒

Orange Flavor

# TCATA task

**Check and uncheck words** to track changes in the orange juice. At each moment, the words that are **checked** should **describe** the **orange juice** (check *all* that apply, in that moment).



0:15

☐

Astringent

☐

Off Flavor

☒

Sourness

☐

Bitterness

☒

Sweetness

☒

Orange Flavor

# TCATA task

**Check and uncheck words** to track changes in the orange juice. At each moment, the words that are **checked** should **describe** the **orange juice** (check *all* that apply, in that moment).



0:18

☐

Astringent

☐

Off Flavor

☐

Sourness

☐

Bitterness

☒

Sweetness

☒

Orange Flavor

# TCATA task

**Check and uncheck words** to track changes in the orange juice. At each moment, the words that are **checked** should **describe** the **orange juice** (check *all* that apply, in that moment).



0:21

☐

Astringent

☐

Off Flavor

☐

Sourness

☐

Bitterness

☐

Sweetness

☒

Orange Flavor

# TCATA task

**Check and uncheck words** to track changes in the orange juice. At each moment, the words that are **checked** should **describe** the **orange juice** (check *all* that apply, in that moment).



0:24

☐

Astringent



Off Flavor

☐

Sourness

☐

Bitterness

☐

Sweetness



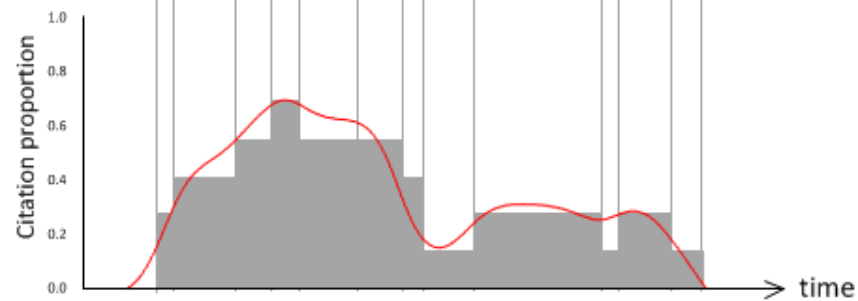
Orange Flavor

# TCATA curves

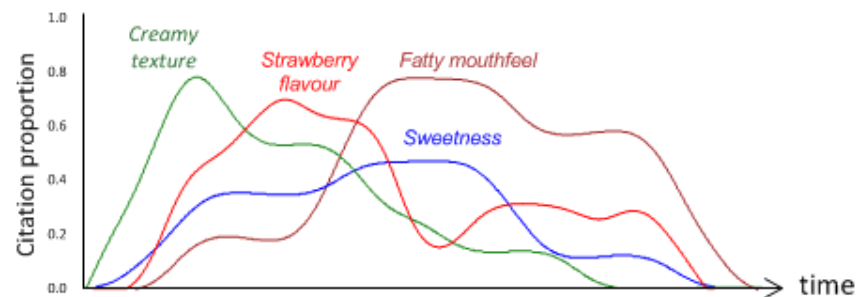


Aggregate TCATA data to get citation proportions for *Strawberry flavour*

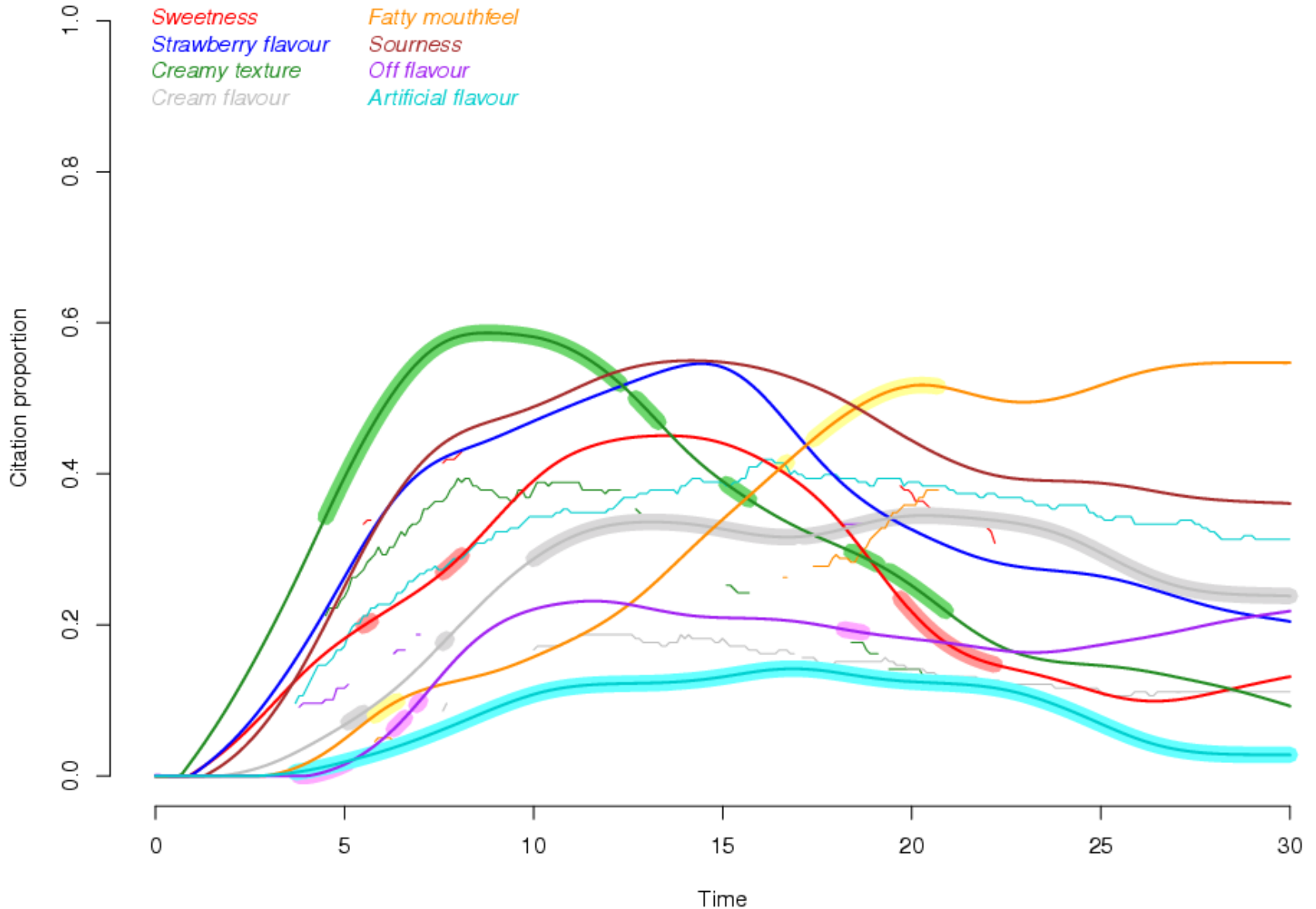
(with optional smoothing)



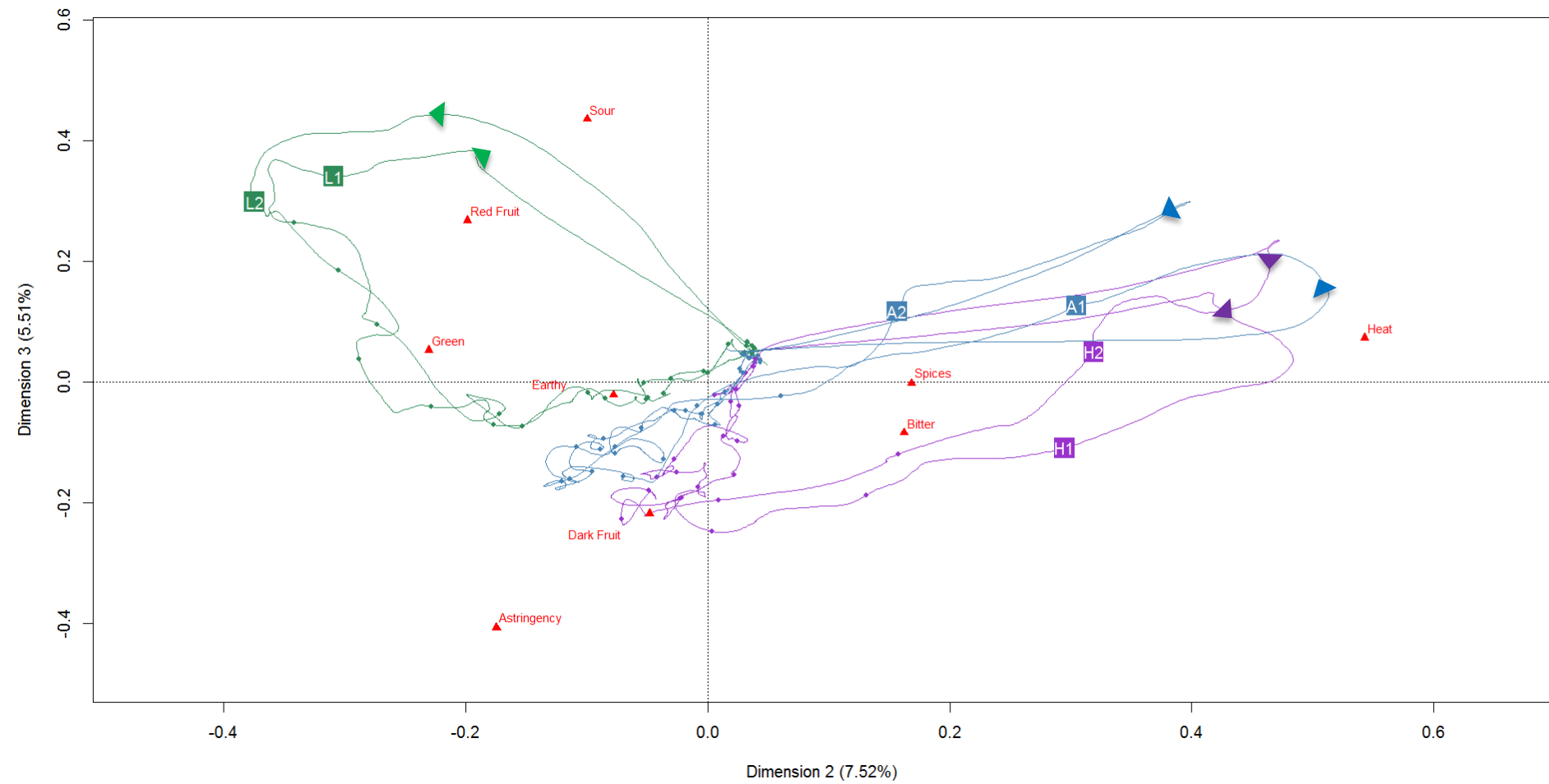
Present TCATA curves for all attributes



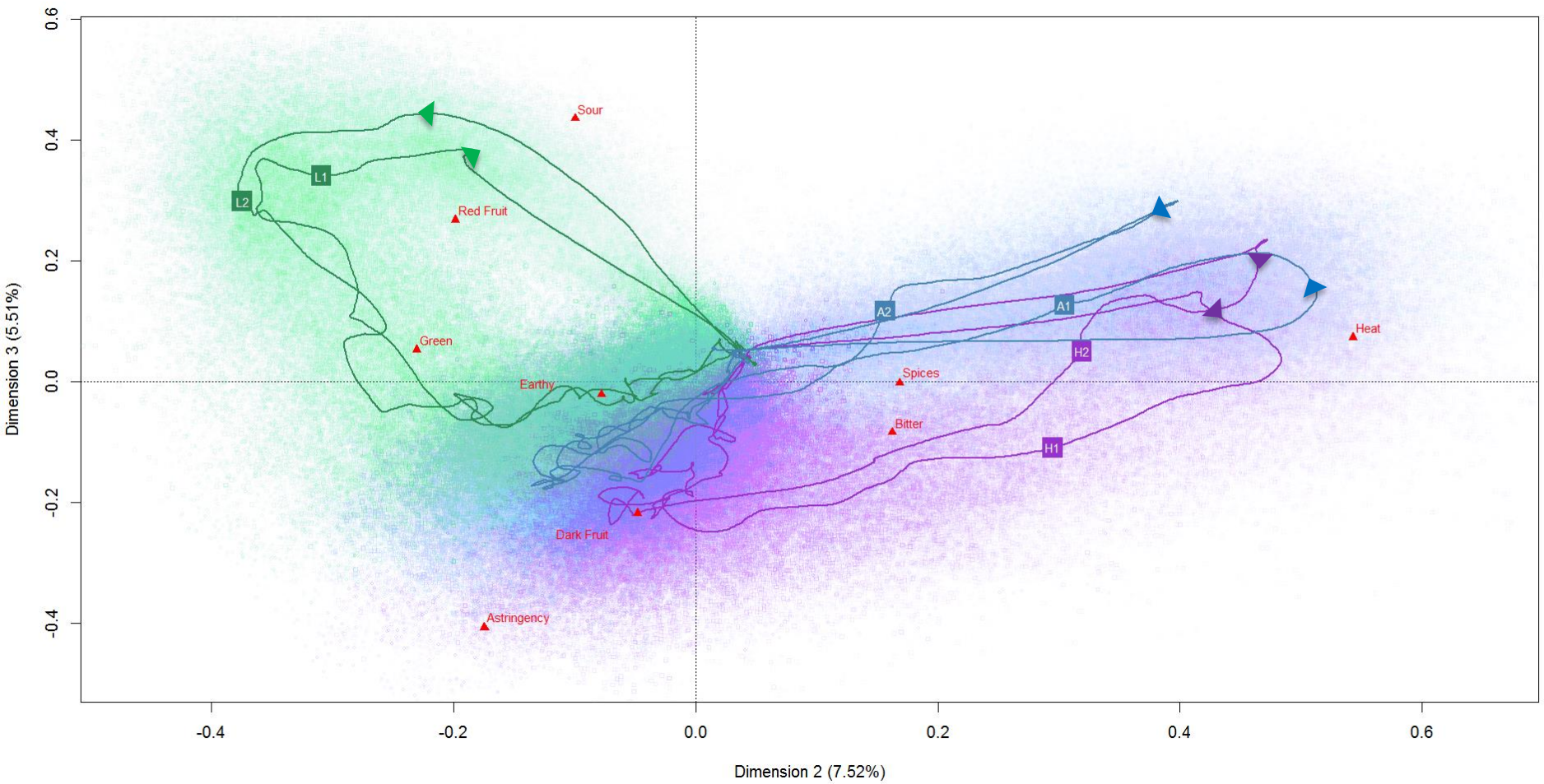
# TCATA curves & reference lines



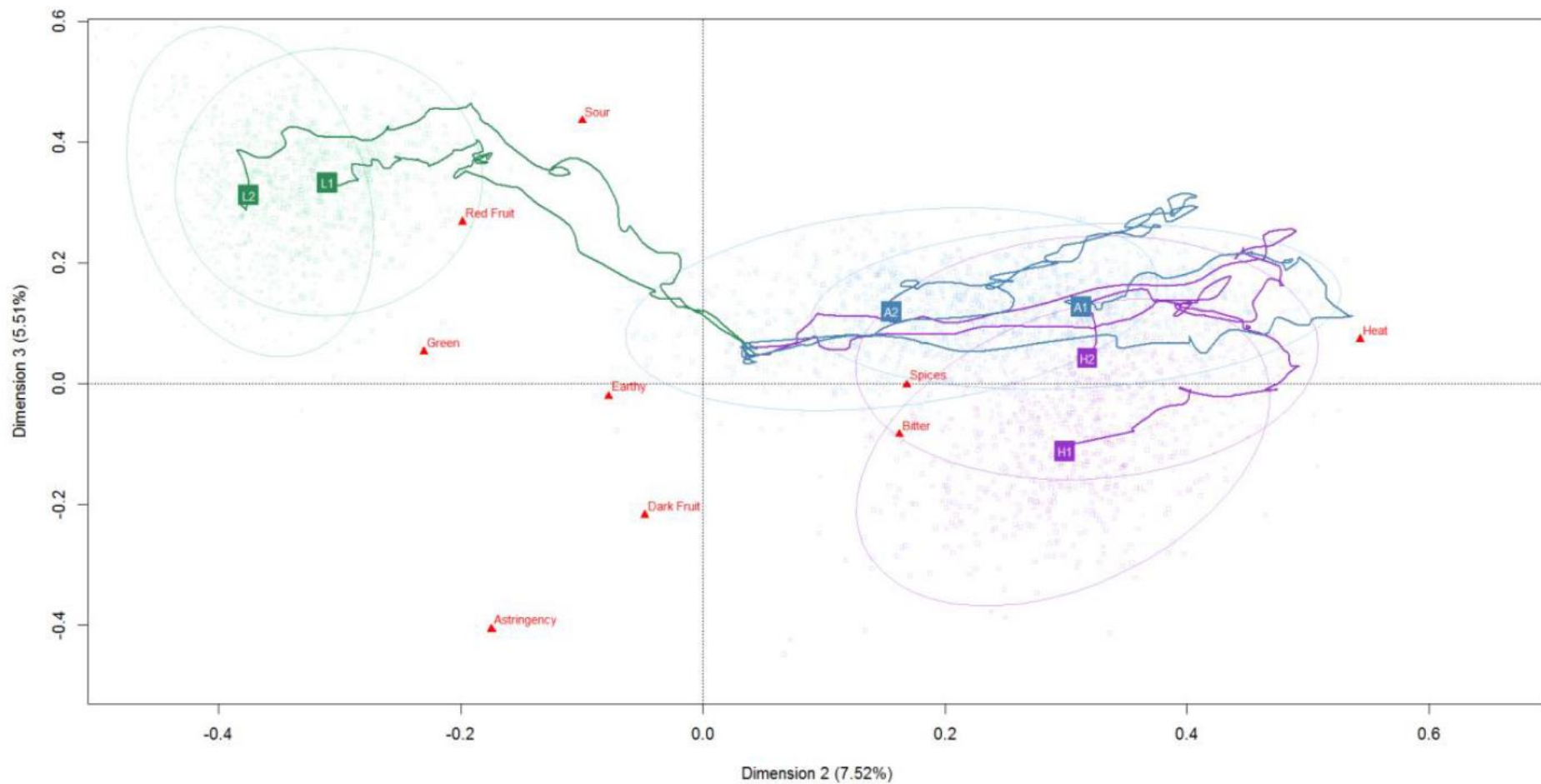
# Trajectories



# Trajectories & Contrails



# **Animated sequences & data concentration ellipses**



*This thumbnail image appears in place of the video that was shown at the conference.*

## **Refereed Publications**

- Ares, G., Jaeger, S. R., Antúnez, L., Vidal, L., Giménez, A., Coste, B., Picallo, A., & Castura, J. C. (2015). Comparison of TCATA and TDS for dynamic sensory characterization of food products, *Food Research International*, 78, 148-158. <http://dx.doi.org/10.1016/j.foodres.2015.10.023>
- Baker, A. K., Castura, J. C., & Ross, C. J. Temporal check-all-that-apply characterization of Syrah wine. *Journal of Food Science*. Accepted manuscript.
- Boinbaser, L., Parente, M. E., Castura, J. C., & Ares, G. (2015). Dynamic sensory characterization of cosmetic creams during application using Temporal Check-All-That-Apply (TCATA) questions. *Food Quality and Preference*, <http://dx.doi.org/10.1016/j.foodqual.2015.05.003>
- Castura, J. C., Antúnez, L., Giménez, A., & Ares, G. (2016). Temporal Check-all-that-apply (TCATA): A novel dynamic method for characterizing products. *Food Quality and Preference*, <http://dx.doi.org/10.1016/j.foodqual.2015.06.017> 
- Oliveira, D., Antúnez, L., Giménez, A., Castura, J. C., Deliza, R., & Ares, G. (2015). Sugar reduction in probiotic chocolate-flavored milk: Impact on dynamic sensory profile and liking. *Food Research International*, <http://dx.doi.org/10.1016/j.foodres.2015.05.050>

## **Selected Conference Presentations**

- Castura, J. C., Baker, A. K., & Ross, C. F. (2015). Characterizing wine finish using TCATA product contrails. In *1st Afrosense Conference*. 23-26 November. Stellenbosch, South Africa. Oral Presentation.
- Castura, J. C., Baker, A. K., & Ross, C. F. (2016). Using partial bootstrap to evaluate the uncertainty associated with TCATA product trajectories. In *14th Agrostat Symposium on Statistical Methods for the Food Industry*. 21-24 March. Lausanne, Switzerland. Oral Presentation, <https://www.youtube.com/watch?v=v8X1XNSR3b4>
- Castura, J. C., King, S. C., Li, Q., & Serrano, D. (2015). Using Temporal Check-All-That-Apply (TCATA) to understand the relationship among hedonic, emotion, and sensory attributes. In *11th Pangborn Sensory Science Symposium*. 23-27 August. Gothenburg, Sweden. Poster Presentation.