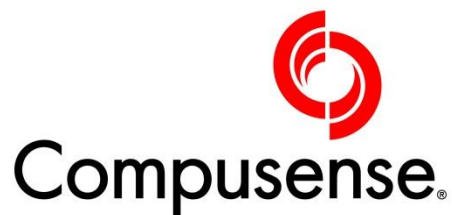


Temporal Methods: A comparative study of four different techniques

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RESEARCH THAT RESONATES
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FOOD SCIENCE & TECHNOLOGY
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Time and Sensation

Time is a sort of river of passing events ...

Marcus Aurelius

Sensation possesses quality, intensity and duration.

Research Objectives

1. Gain a better understanding of the four temporal methods
2. Create a valid basis for comparison of the methods
3. Provide objective data concerning the outcomes of each method
4. Provide some guidance in the rationale of selecting the most appropriate method to answer a research question

The Methods

- Sequential Profile (SP)
- Temporal Order of Sensations (TOS)
- Temporal Dominance of Sensations (TDS)
- Dual-Attribute Time Intensity (DATI)

PRODUCTS AND ATTRIBUTES

The Products



Kashi Trail Mix
Chewy Granola
Bars



Nature Valley Trail
Mix, Fruit & Nut



Kashi 7 Whole
Grains and
Almonds



Fibre1 Oats &
Caramel

Attributes Measured

Sequential Profiling, TOS, TDS

Grain

Caramelized

Dried Fruit

Nutty

Sweet

Dual Attribute Time Intensity

Overall Flavour

Breakdown

Analysis of each of the methods

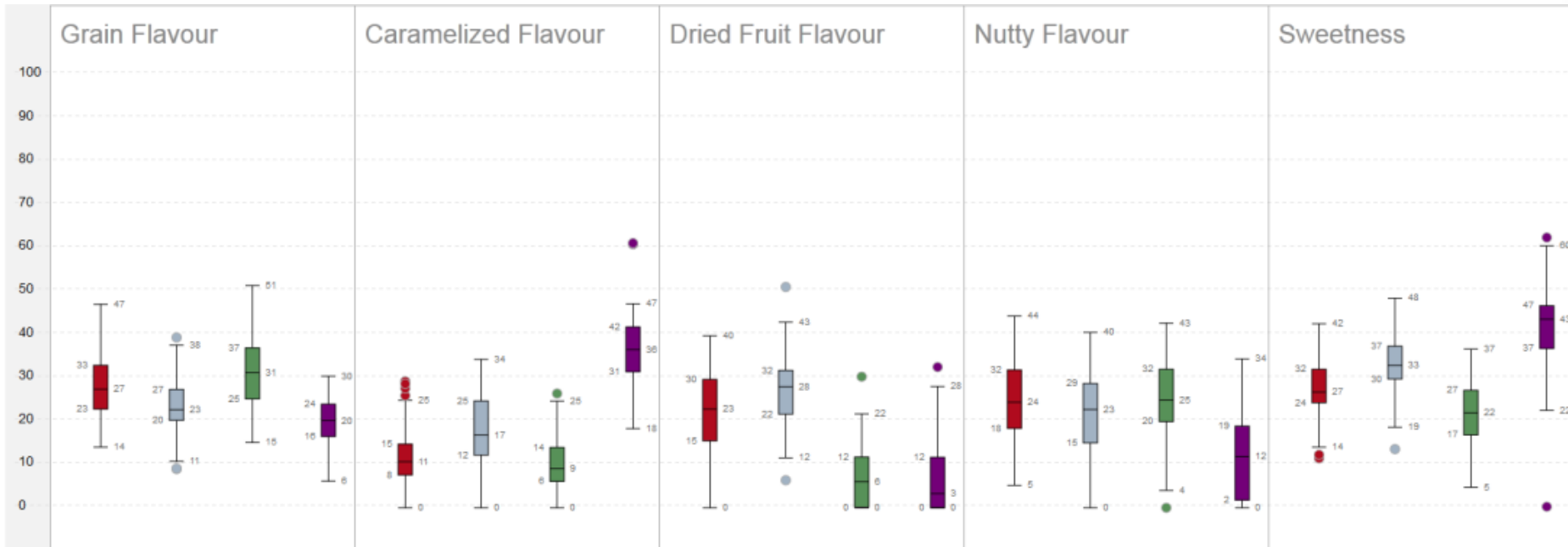
THE STUDY

Sequential Profiling (SP)

- Conventional line-scale ballot presented at specific intervals
- Attribute intensity at each time point
- May record multiple bites or product exposures
- Analysis can be at specific time points or over the entire time of the test

Results – SP

10 s



- Kashi Trail Mix Chewy Granola Bars
- Nature Valley Trail Mix, Fruit & Nut
- Kashi Seven Whole Grains and Almonds
- Fiber1 Oats & Caramel

Results – SP

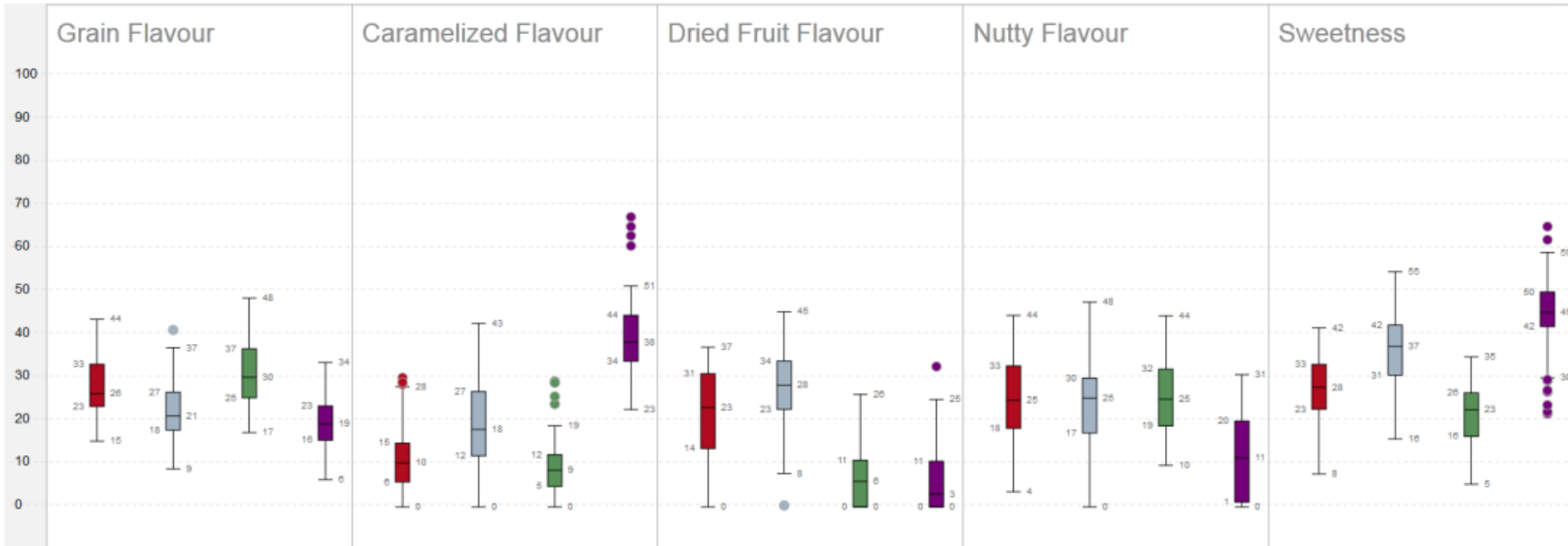
20 s



- Kashi Trail Mix Chewy Granola Bars
- Nature Valley Trail Mix, Fruit & Nut
- Kashi Seven Whole Grains and Almonds
- Fiber1 Oats & Caramel

Results – SP

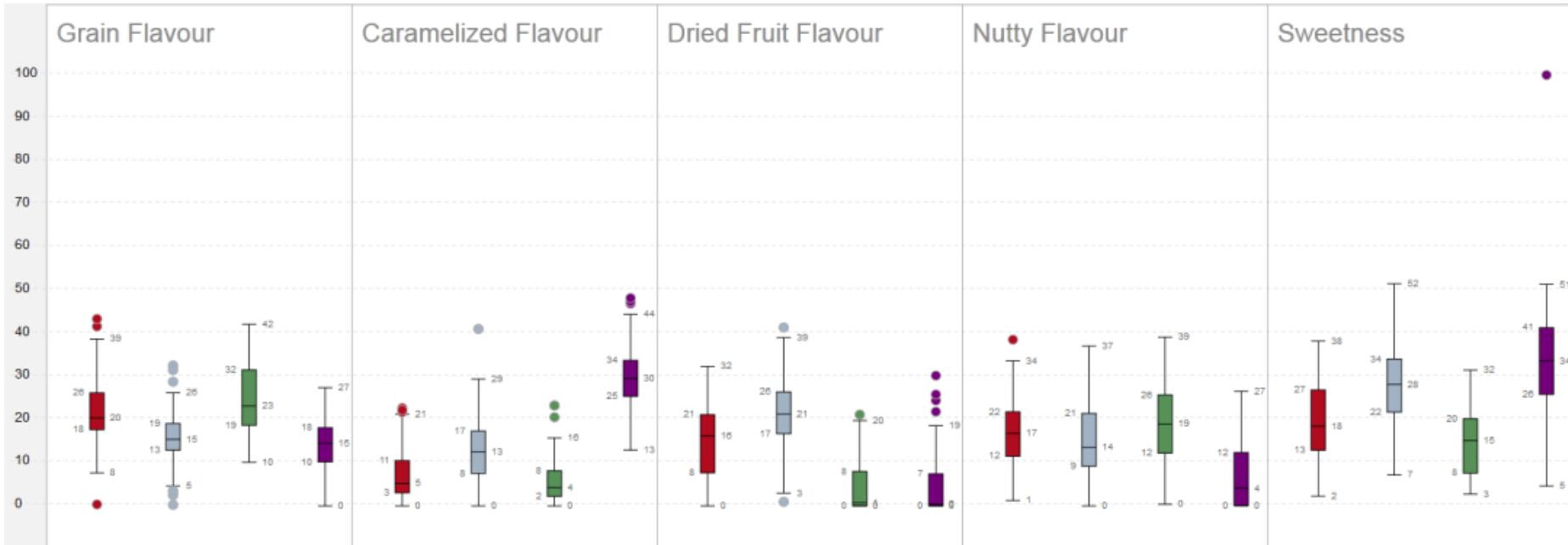
30 s



- Kashi Trail Mix Chewy Granola Bars
- Nature Valley Trail Mix, Fruit & Nut
- Kashi Seven Whole Grains and Almonds
- Fiber1 Oats & Caramel

Results – SP

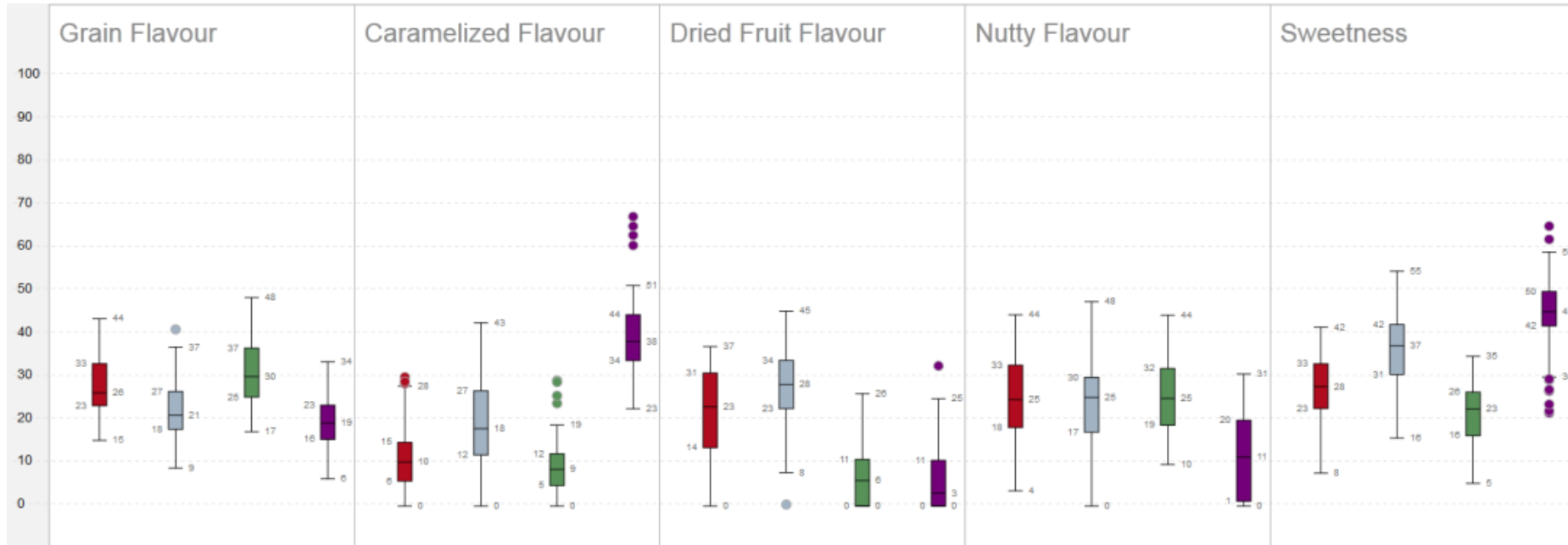
60 s



- Kashi Trail Mix Chewy Granola Bars
- Nature Valley Trail Mix, Fruit & Nut
- Kashi Seven Whole Grains and Almonds
- Fiber1 Oats & Caramel

Results - SP





30 s

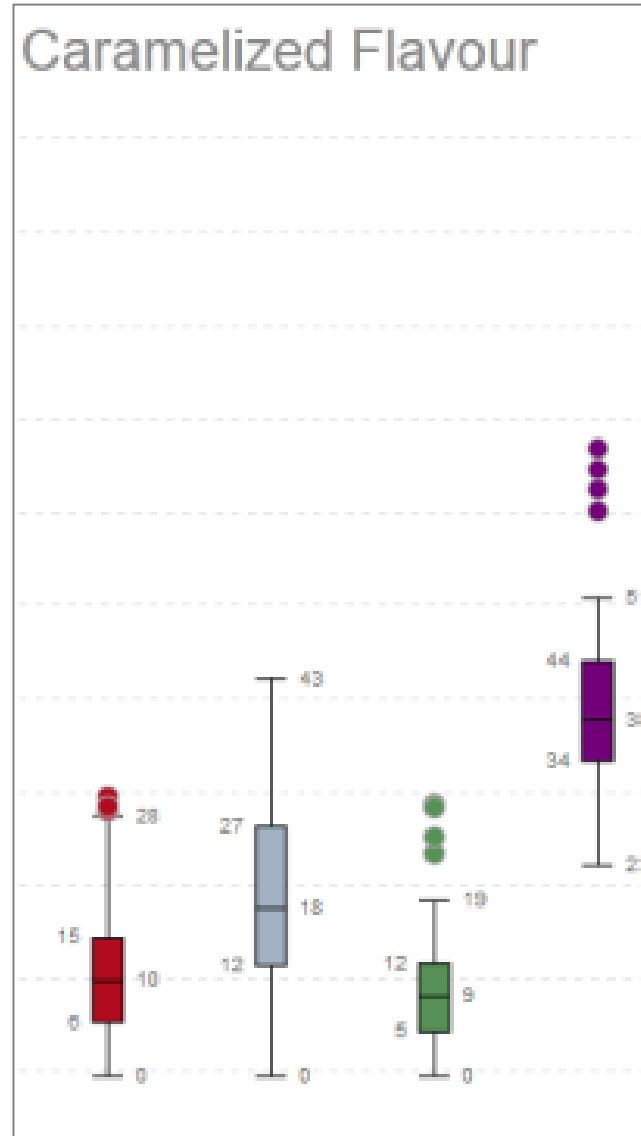


- Kashi Trail Mix Chewy Granola Bars
- Nature Valley Trail Mix, Fruit & Nut
- Kashi Seven Whole Grains and Almonds
- Fiber1 Oats & Caramel

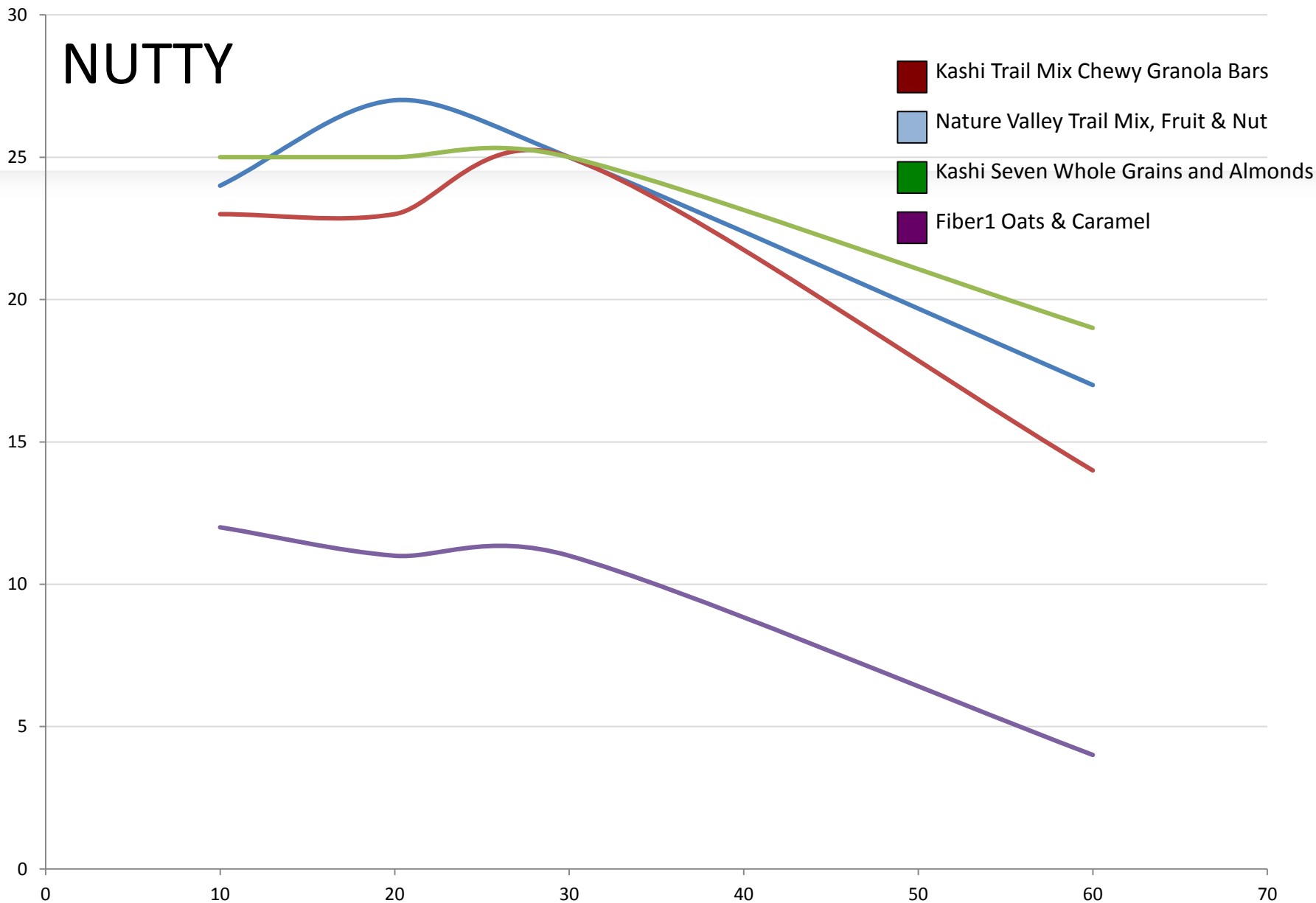
Results - SP

“Caramelized
Flavour” at 30 s

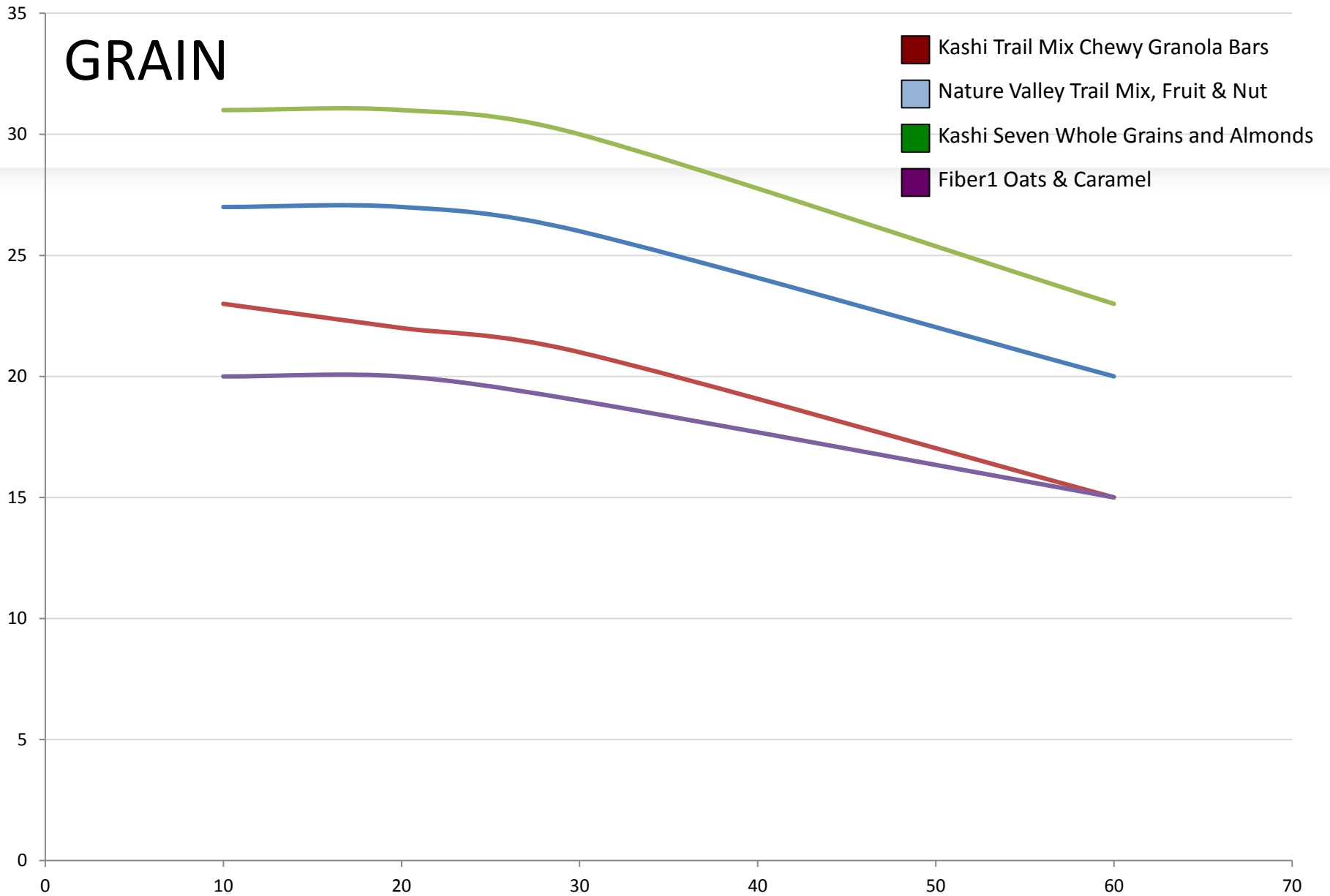
-  Kashi Trail Mix Chewy Granola Bars
-  Nature Valley Trail Mix, Fruit & Nut
-  Kashi Seven Whole Grains and Almonds
-  Fiber1 Oats & Caramel



NUTTY



GRAIN



Outcome - SP

- **SP** data shows

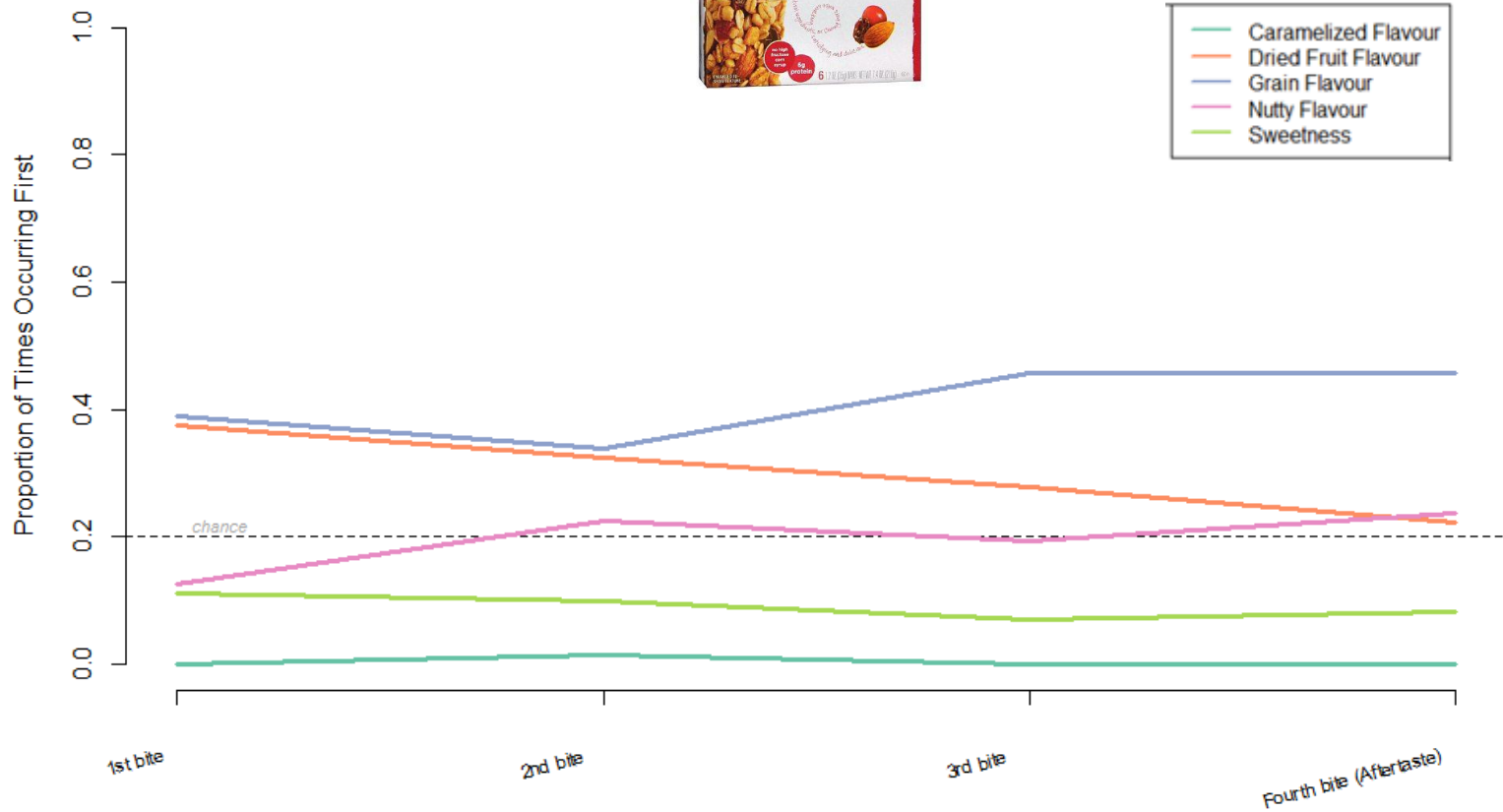
The intensities of the attributes at each time point and changes over time.

Temporal Order of Sensations (TOS)

TOS measures the order that key attributes appear over the eating experience.

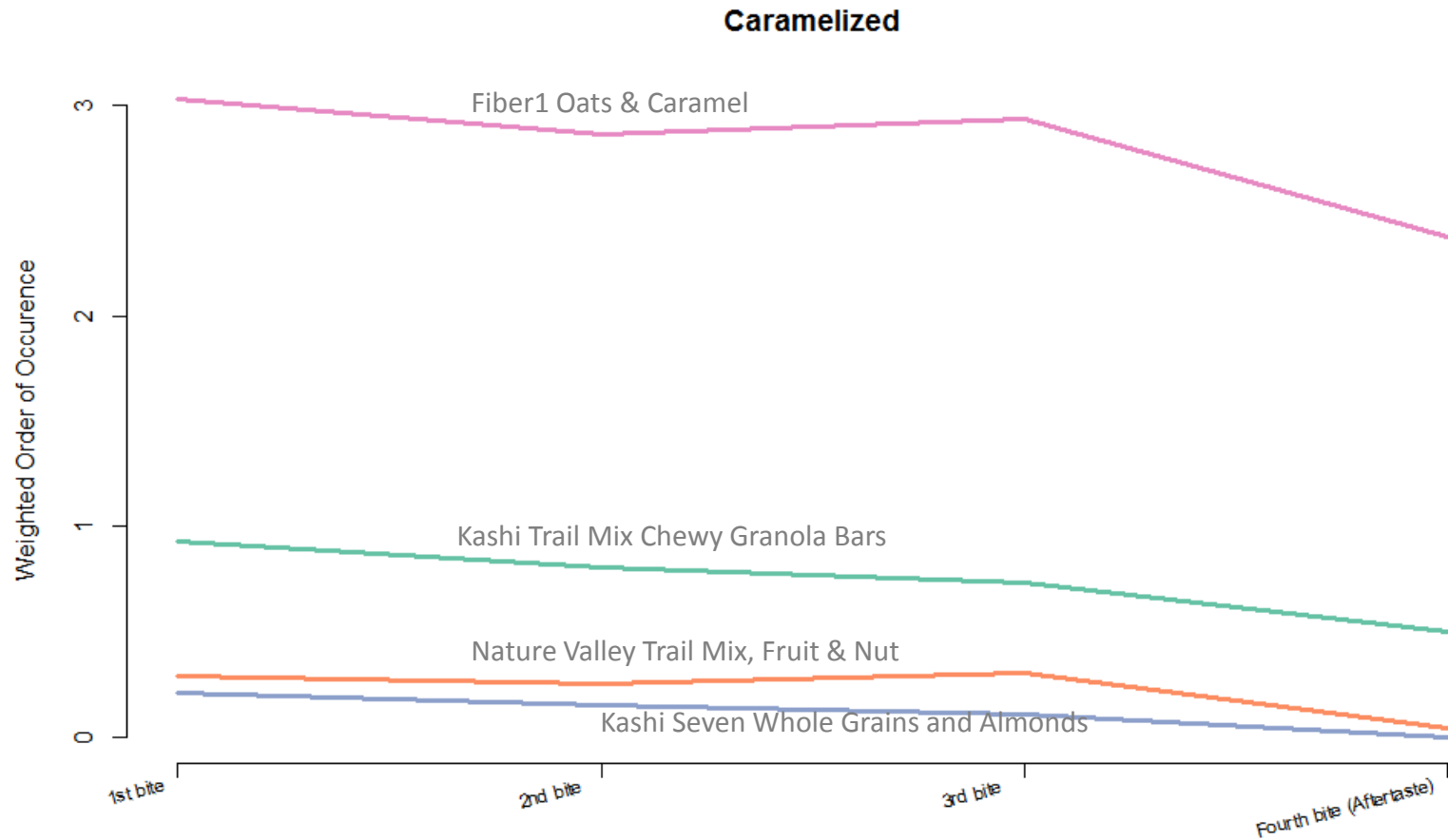
Results - TOS

Multi-attribute for single product



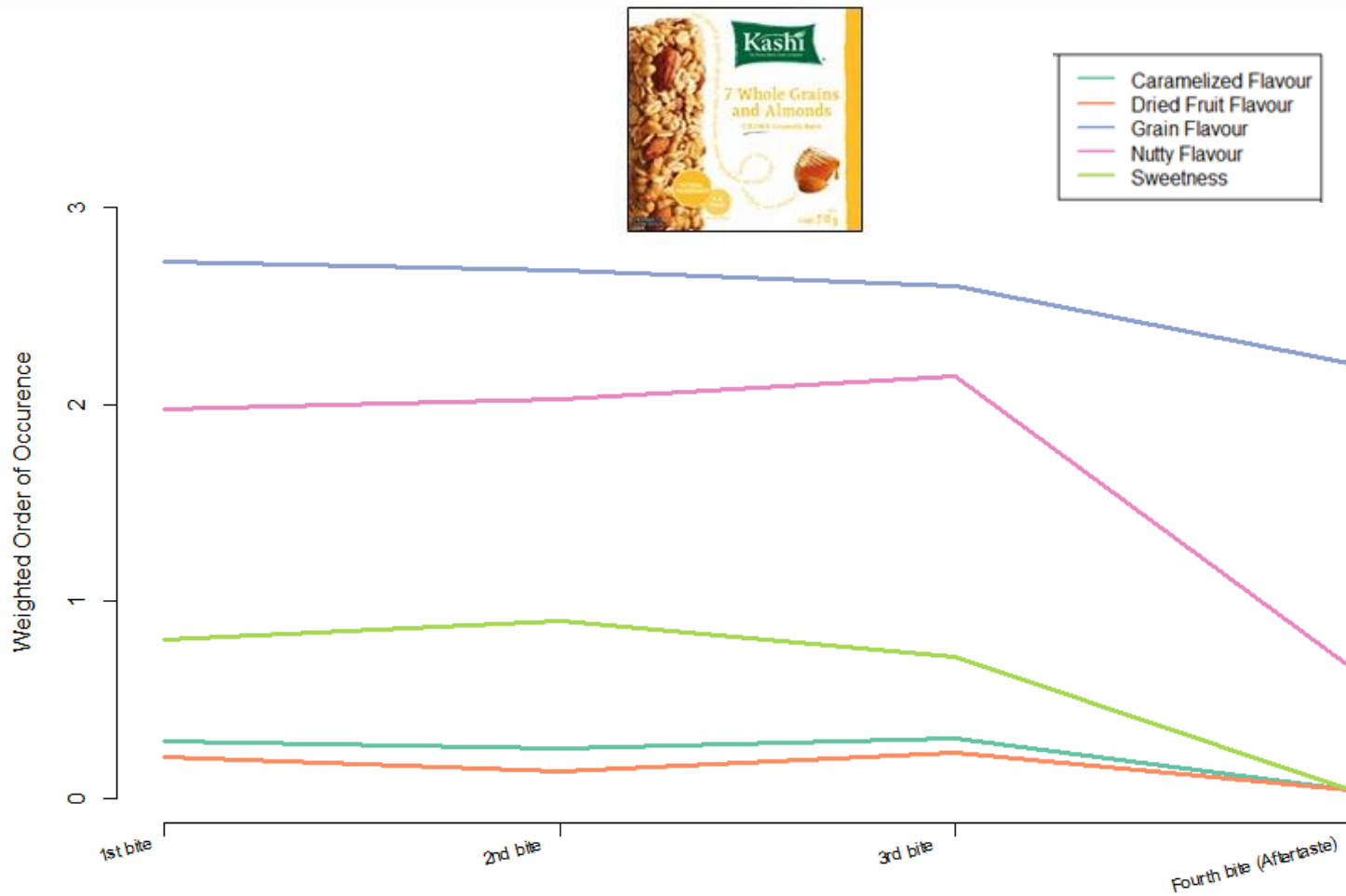
Results - TOS

Multi-product for single attribute



Results - TOS

Weighted Order of Occurrence



Outcome - TOS

- **TOS** results for Fibre1 Oats & Caramel
 - Identify Caramelized Flavour and Sweetness as the attributes with the highest weight
 - Consistent with SP results.

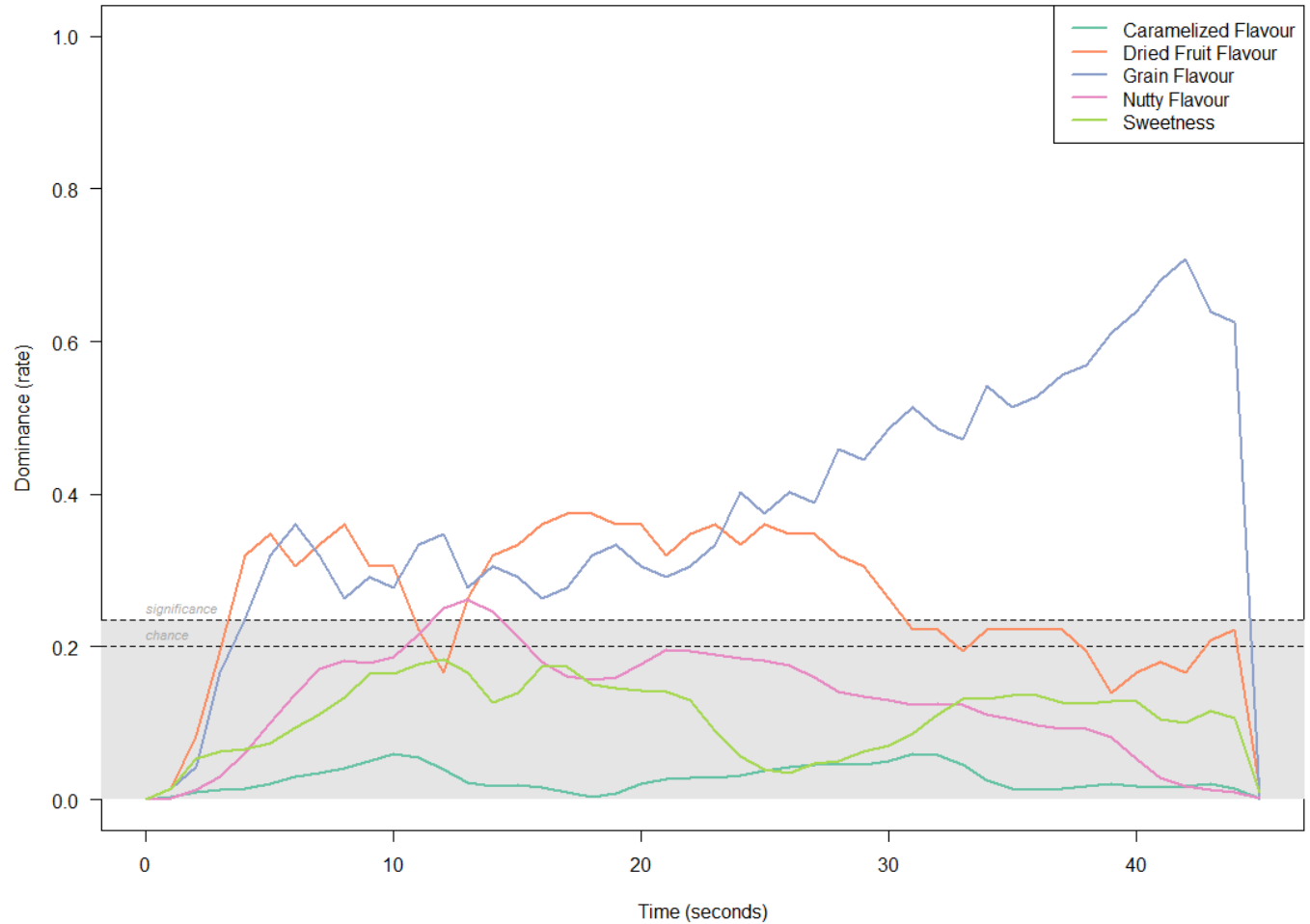
Temporal Dominance of Sensations (TDS)

TDS

- Records the sequence of dominance of different attributes
- Gives an overall temporal picture of a product

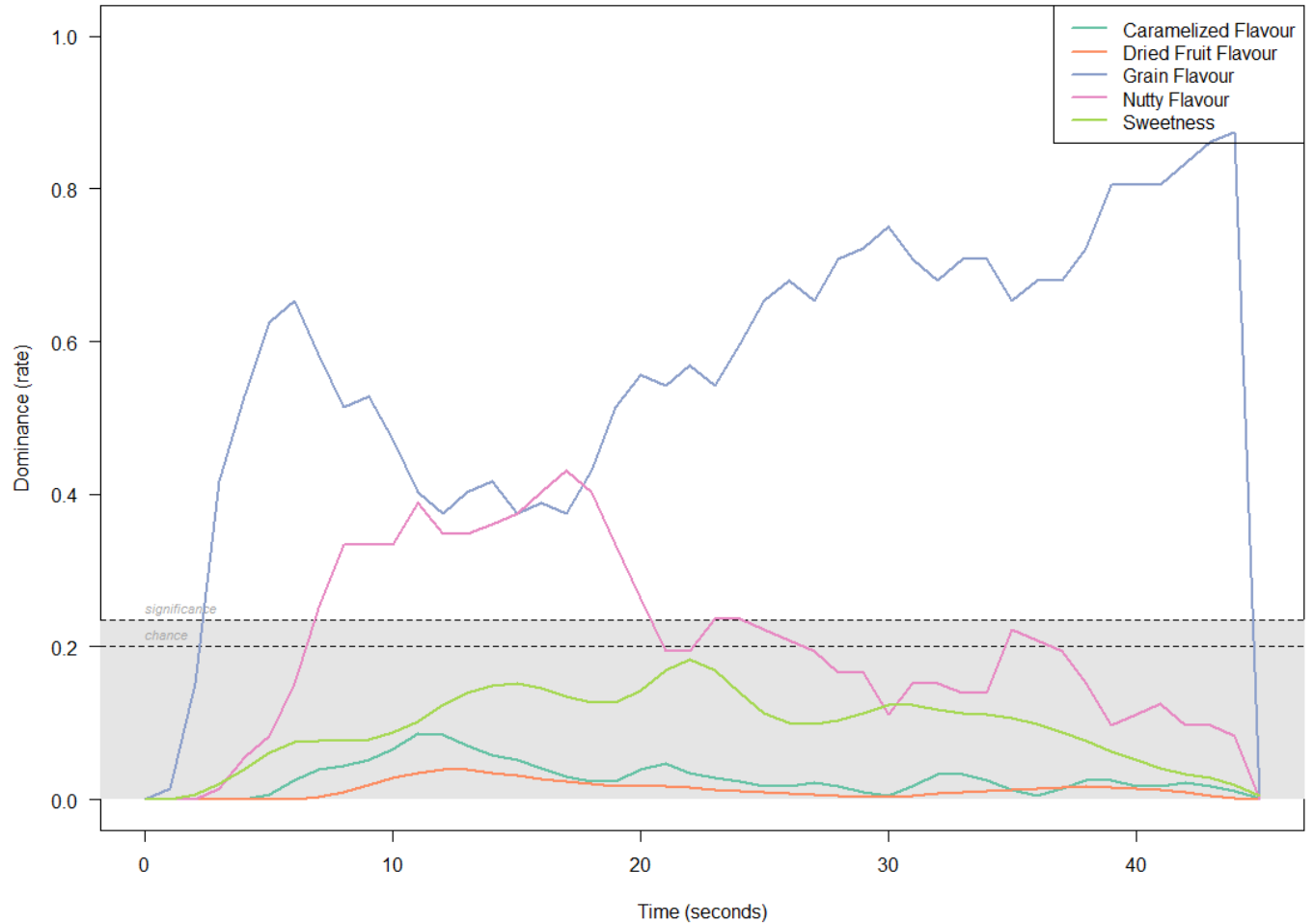
Results -TDS

TDS Panel Average (Smoothed data)



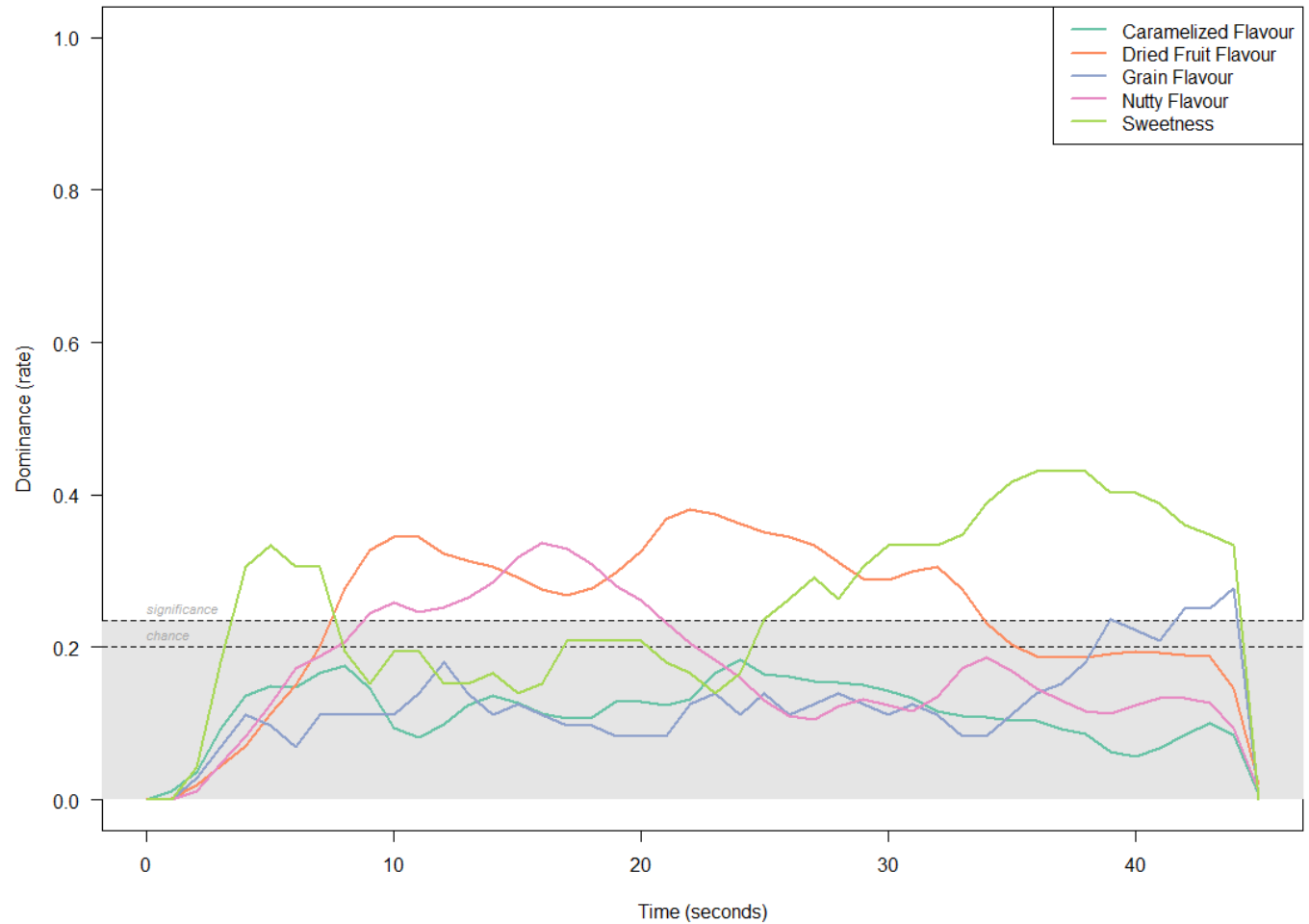
Results -TDS

TDS Panel Average (Smoothed data)



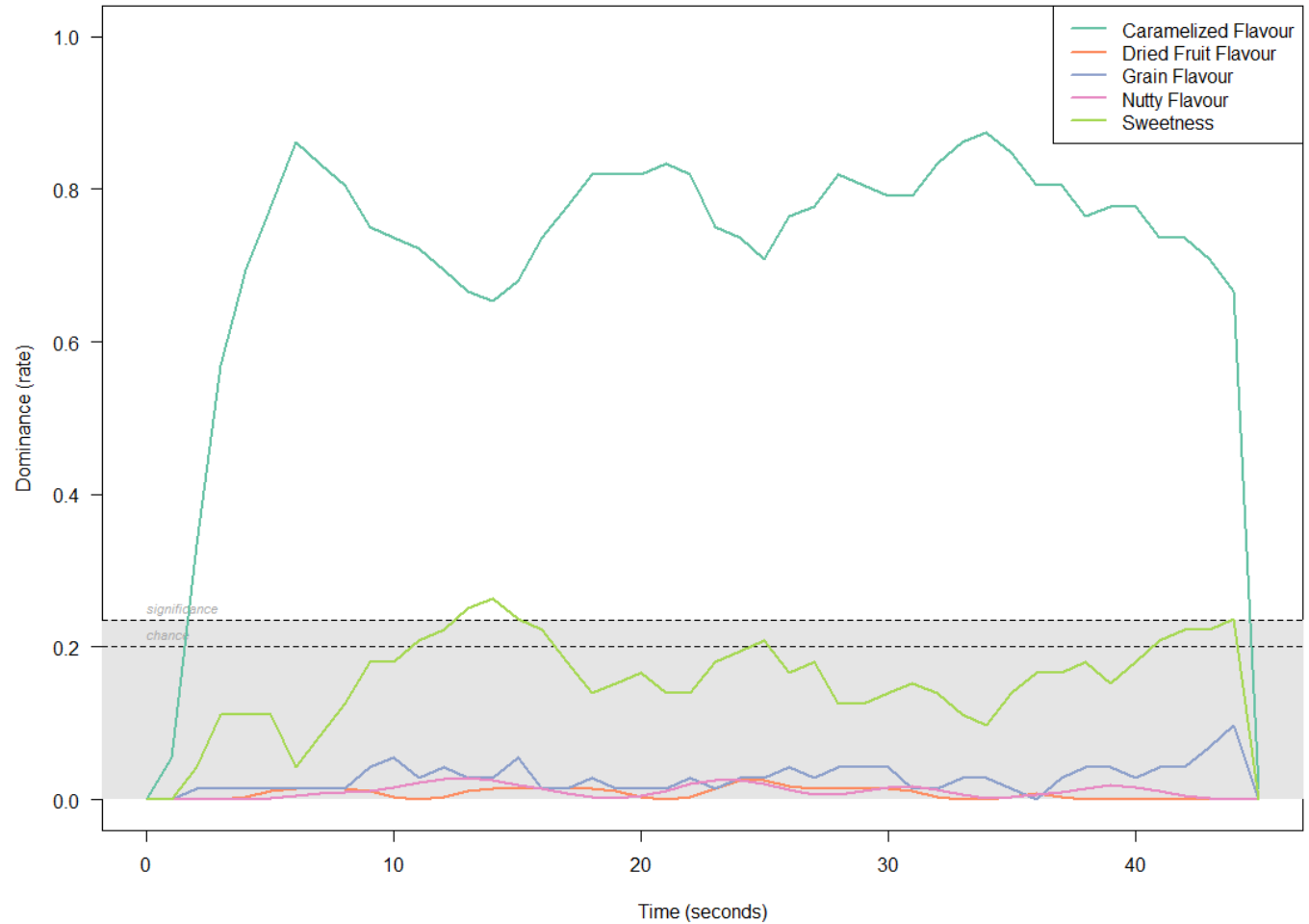
Results -TDS

TDS Panel Average (Smoothed data)

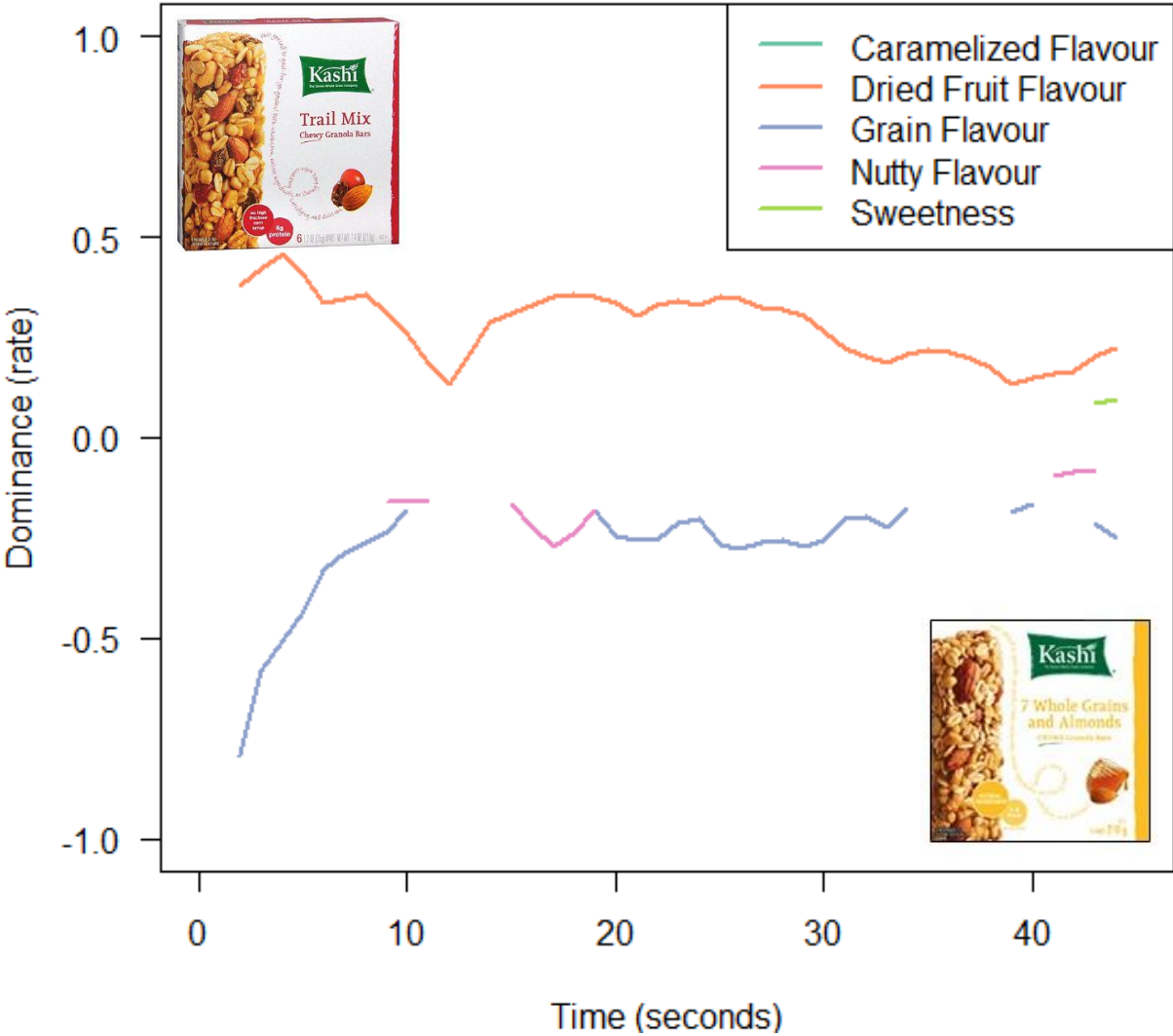


Results -TDS

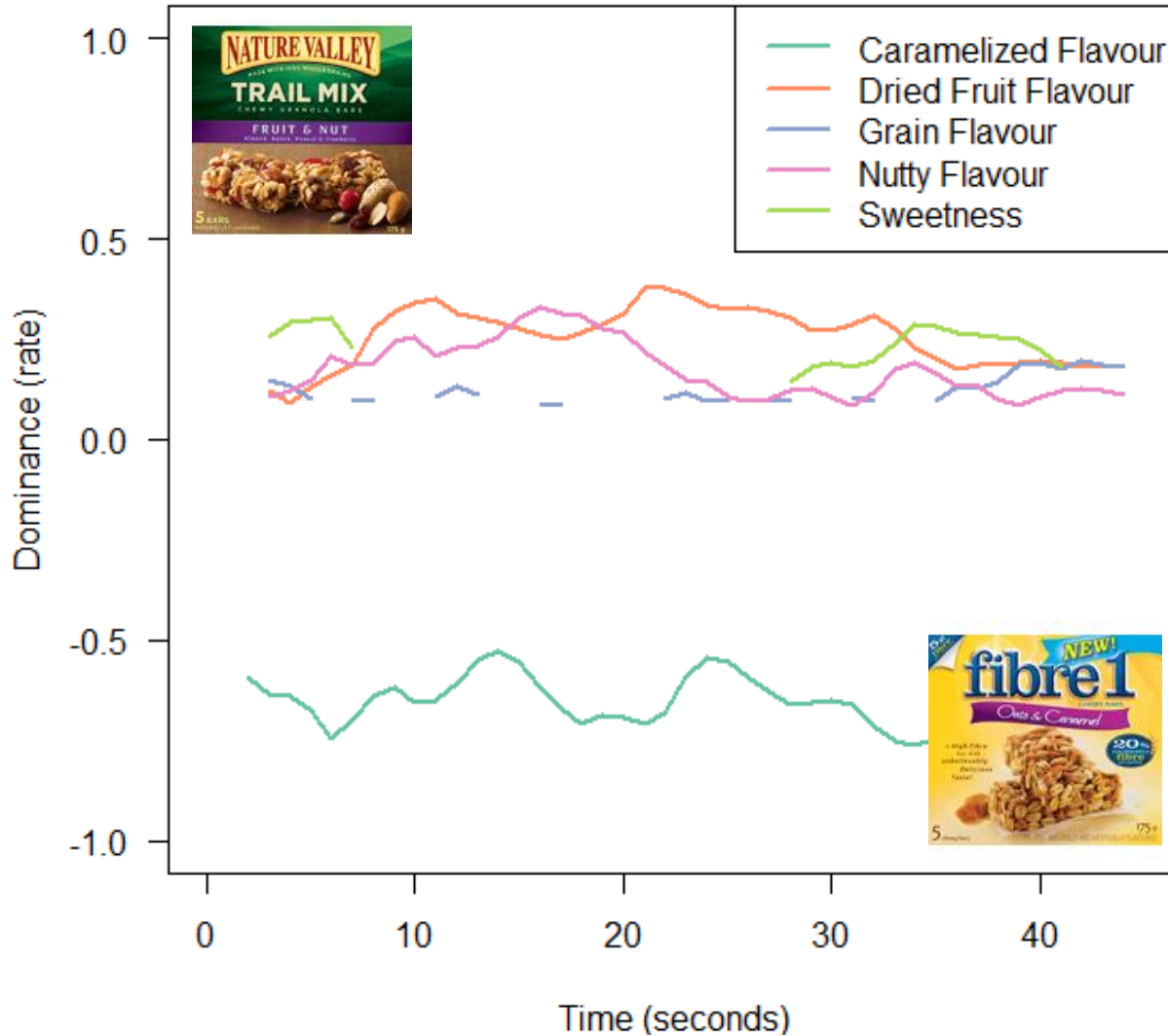
TDS Panel Average (Smoothed data)



Chewy Trail vs. Chewy 7 Grain



Trail Mix versus Oat & Caramel



Outcome - TDS

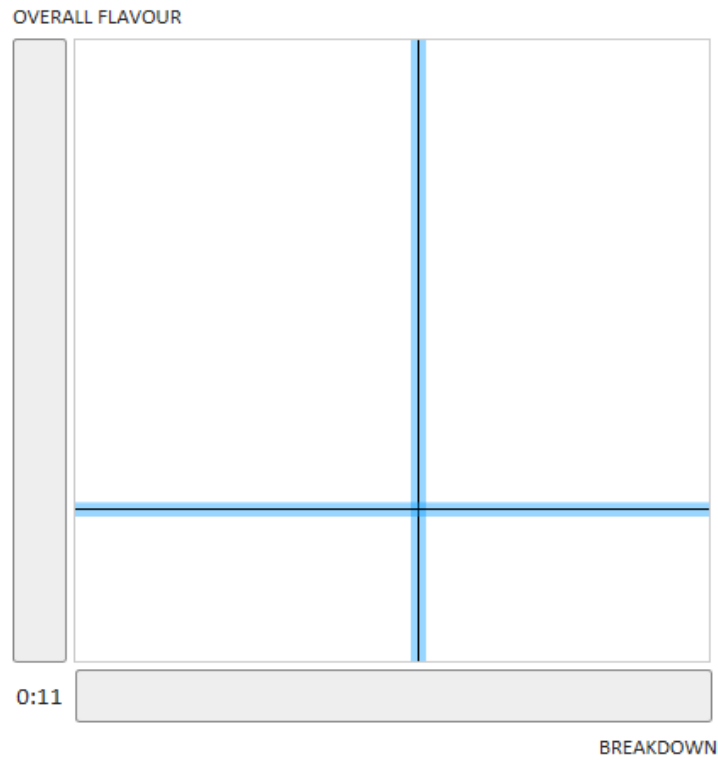
TDS data is quite different from SP

- Increasing dominance of Grain Flavour in both Kashi products
- SP showed a uniform drop in intensity
- Caramelized Flavour dominated for the full duration of Oat & Caramel

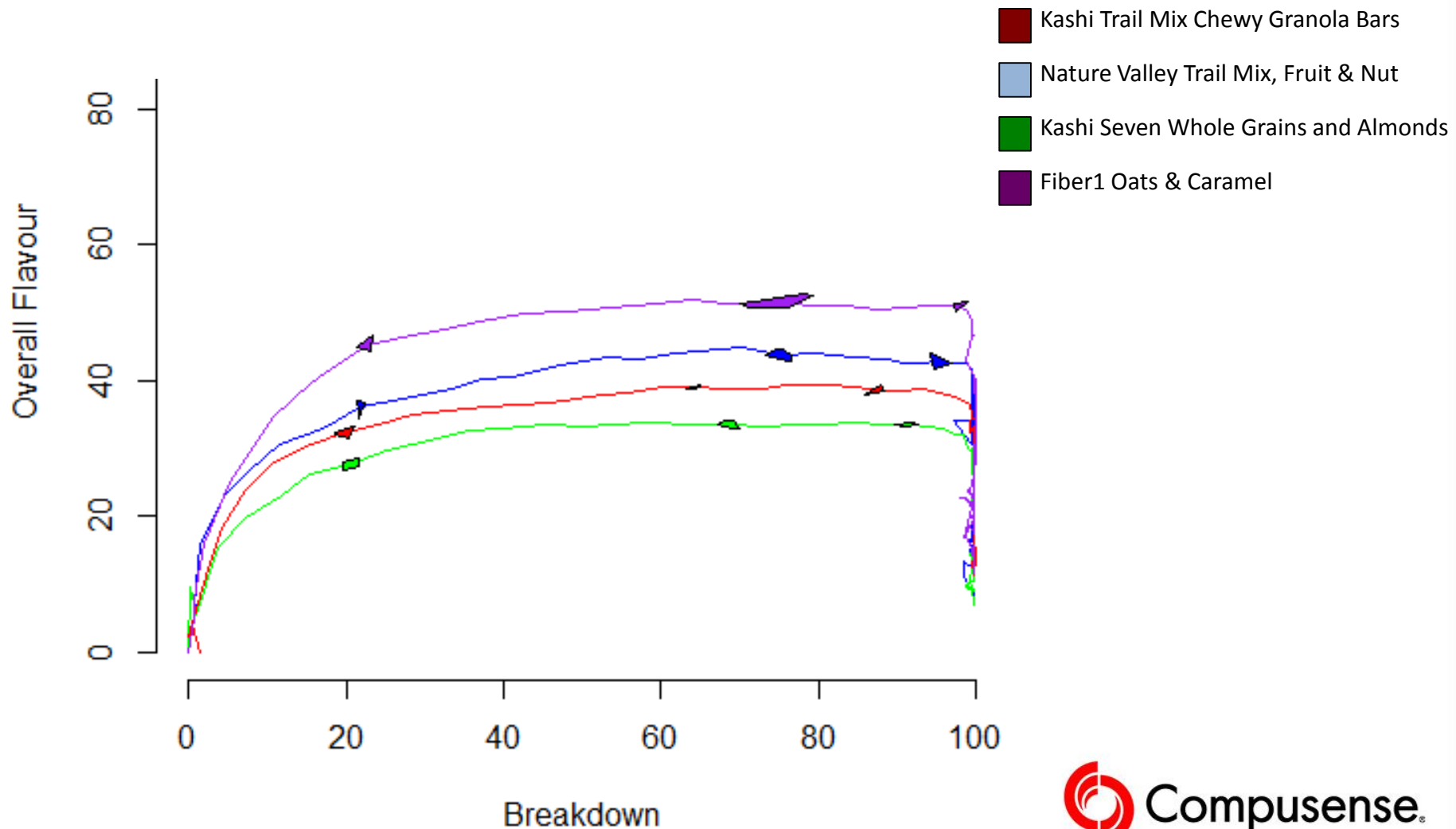
Dual Attribute Time Intensity (DATI)



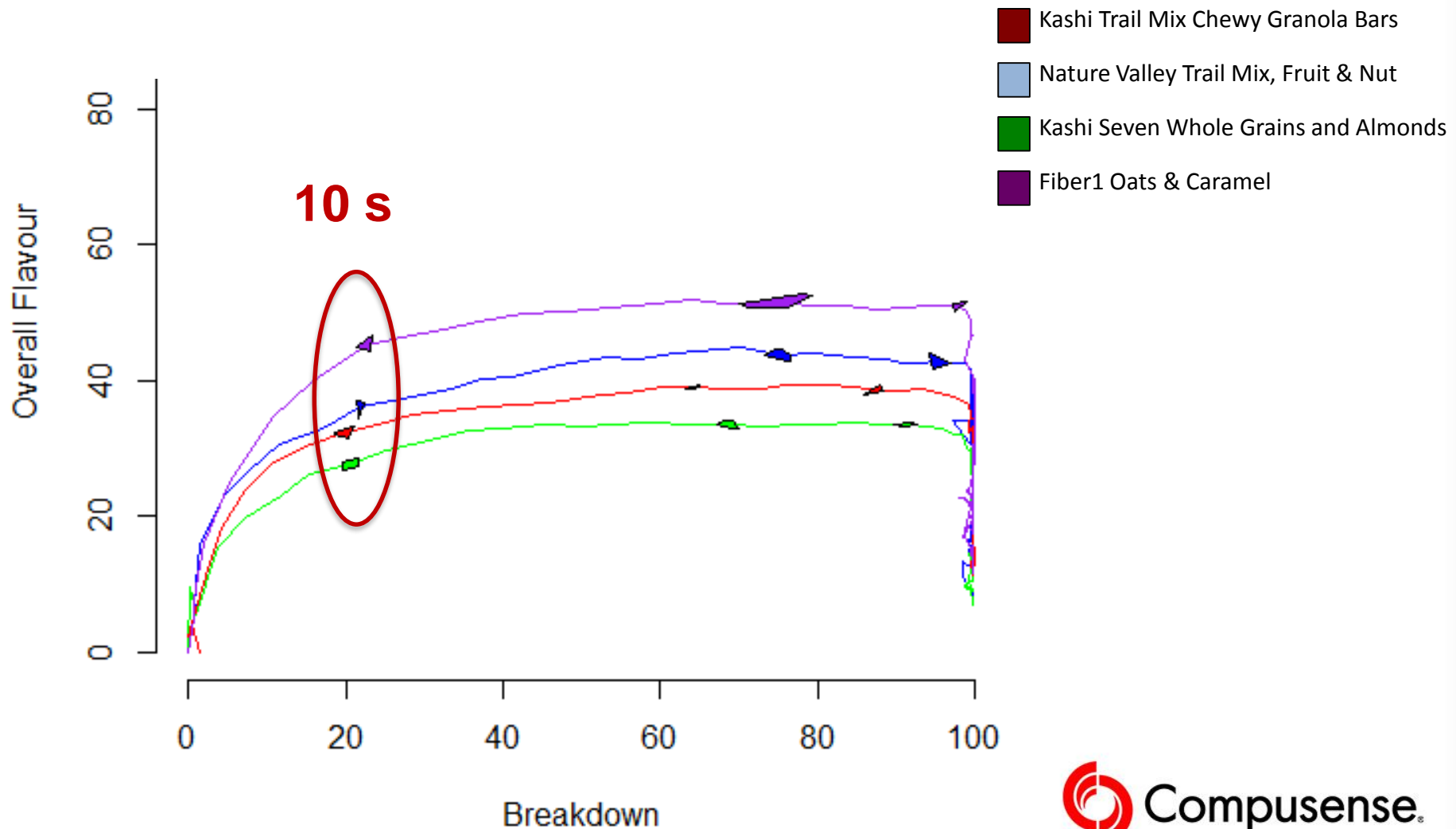
Dual Attribute Time Intensity (DATI)



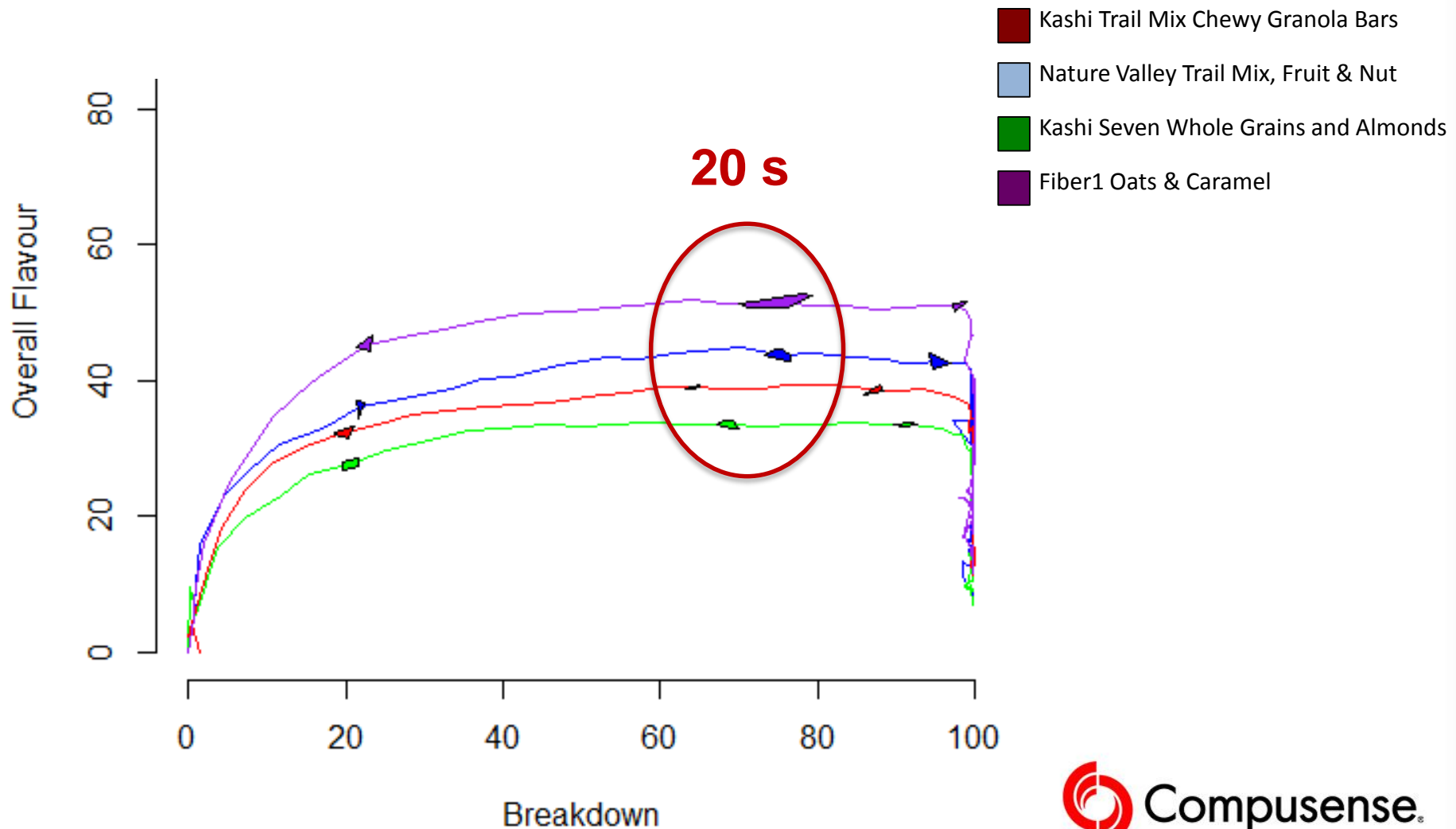
Results - DATI



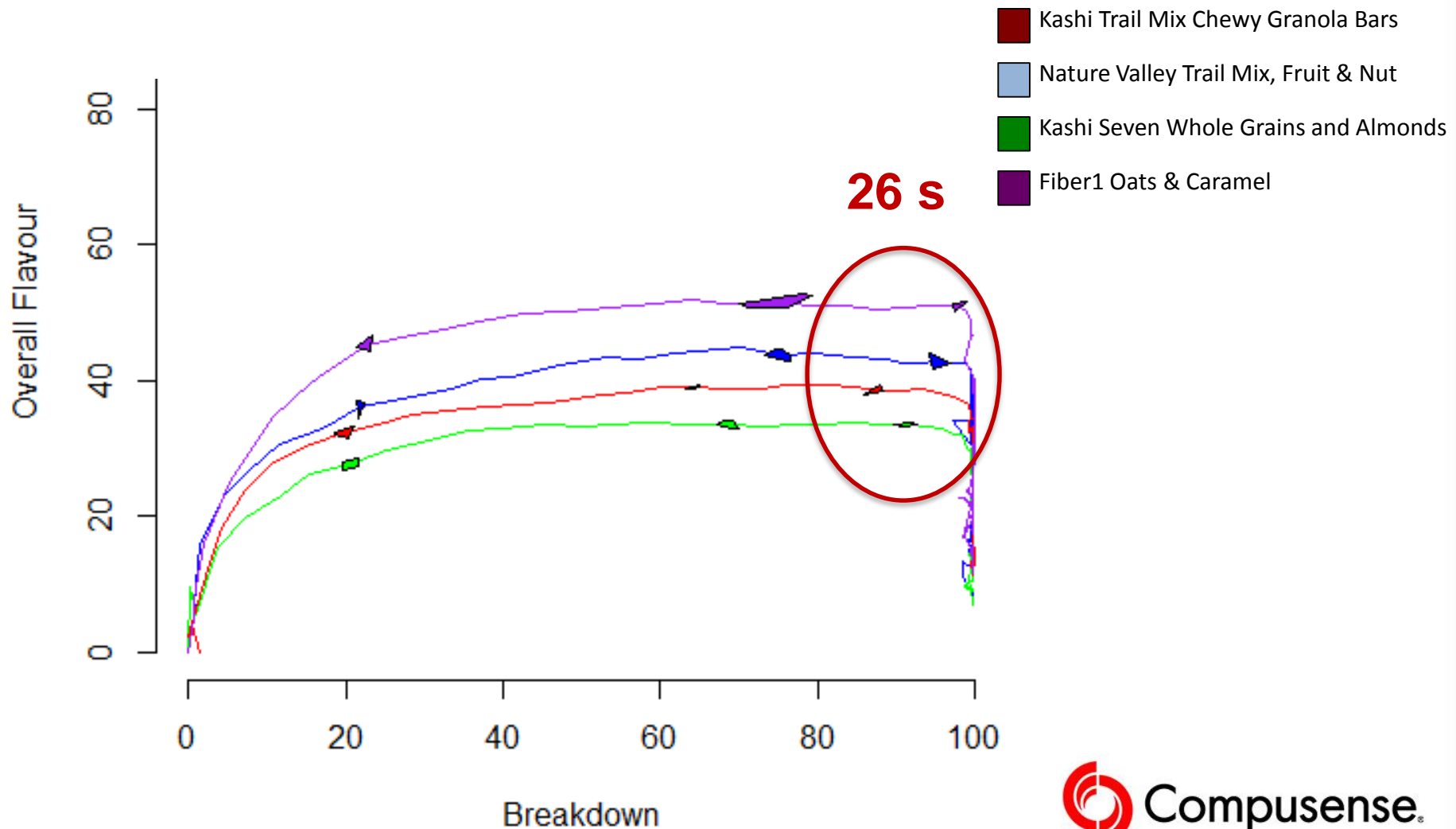
Results - DATI



Results - DATI



Results - DATI



Outcome - DATI

DATI

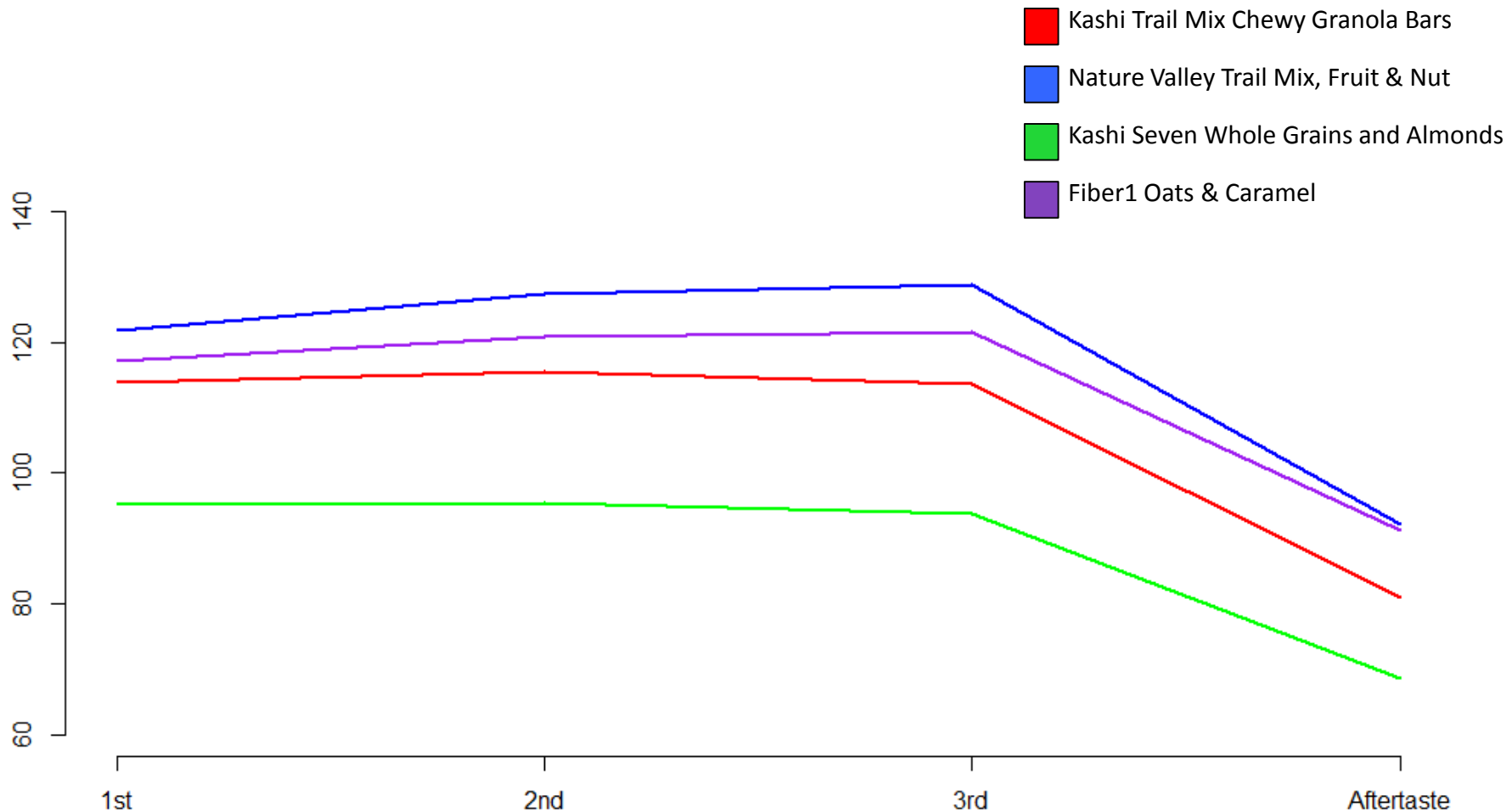
- Fastest breakdown product also had the highest overall flavour
- Breakdown was not captured in data from other methods

Outcome - DATI

Overall flavour in DATI coincided with the highest individual attribute intensity level in SP rather than in the sum of the attribute intensities.

Results – SP

Sum of Average Attribute Intensities



Comparison

Pros

Cons

SP

- Well-defined analytical method
- Ideal for longer times and multiple attributes

- Lengthy training
- Better for slower events

DATI

- Well-defined analytical method
- Ideal for two attributes at any time interval

- Lengthy training and data collection
- Few panelists can perform task well

TDS

- Good screening tool
- Multiple attributes

- Restricted to two attributes

TOS

- Good screening tool
- Multiple attributes
- Simple to perform

- Poor reproducibility
- Interpretation difficult (not intensity)

- Restricted to order
- Limited application

Recommendations

- Always pretest your samples to determine the temporal problem you want to investigate
- Choose the method based upon your research purpose
- Qualitative results can be obtained by TDS or TOS
- Quantitative results are best obtained through SP or DATI
- A combination of methods may lead to the best outcome

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Thank You!