

Temporal Ranking may enhance our ability to determine how different sweeteners or ingredients affect product flavor profiles.

Temporal ranking for the characterization and better discrimination of protein beverages with different sweeteners

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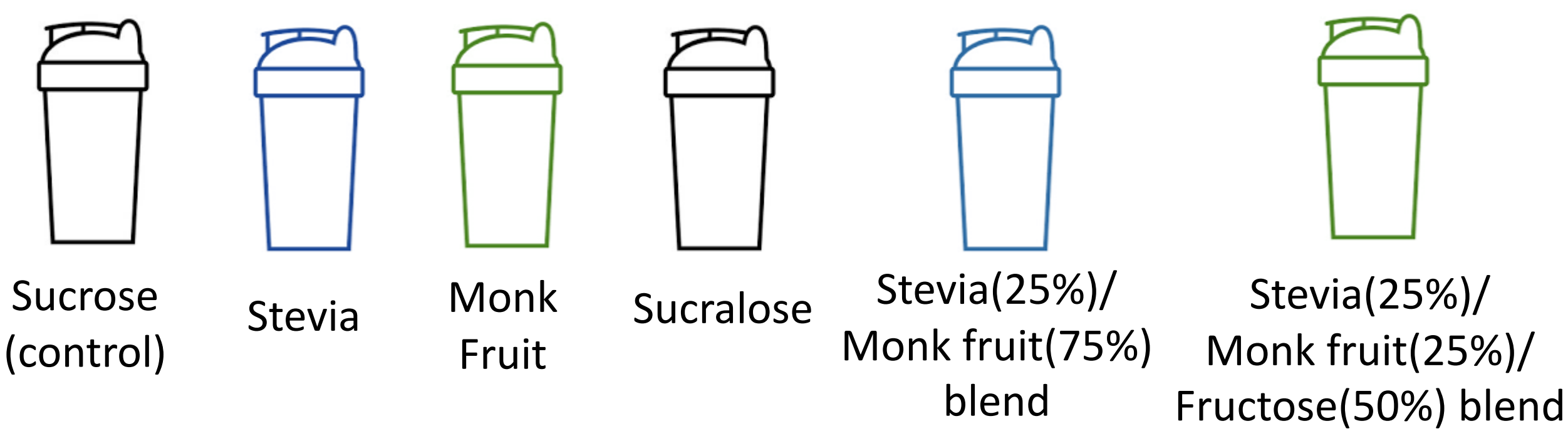
² Compusense Inc., Guelph, ON, N1H 1C5, Canada

Introduction

- Natural non-nutritive sweeteners may have off-flavors such as bitter taste and metallic mouthfeel.
- Temporal methods, such as Temporal check all that apply (TCATA), have been successful documenting these off-flavors (Oltman et al., 2015; Parker et al., 2018).
- Ranking is a well-accepted sensory methodology that allows panelists to assess attributes in relationship to their perceived intensity or in relation to other attributes/products (Lawless and Heymann, 2010).
- This study proposed the application of continuous temporal ranking with only ranking the top three attributes.
- The process was compared to the popular technique of temporal check all that apply.

Materials and Methods

- Six ready to mix vanilla flavored whey protein beverages were formulated 6 different sweetener sources:



- For TR, Panelists were presented a sample, asked to place the entire sample in their mouth, press Start, and then able to rank up to 3 of these attributes until the end of the sample evaluation (figure 1).

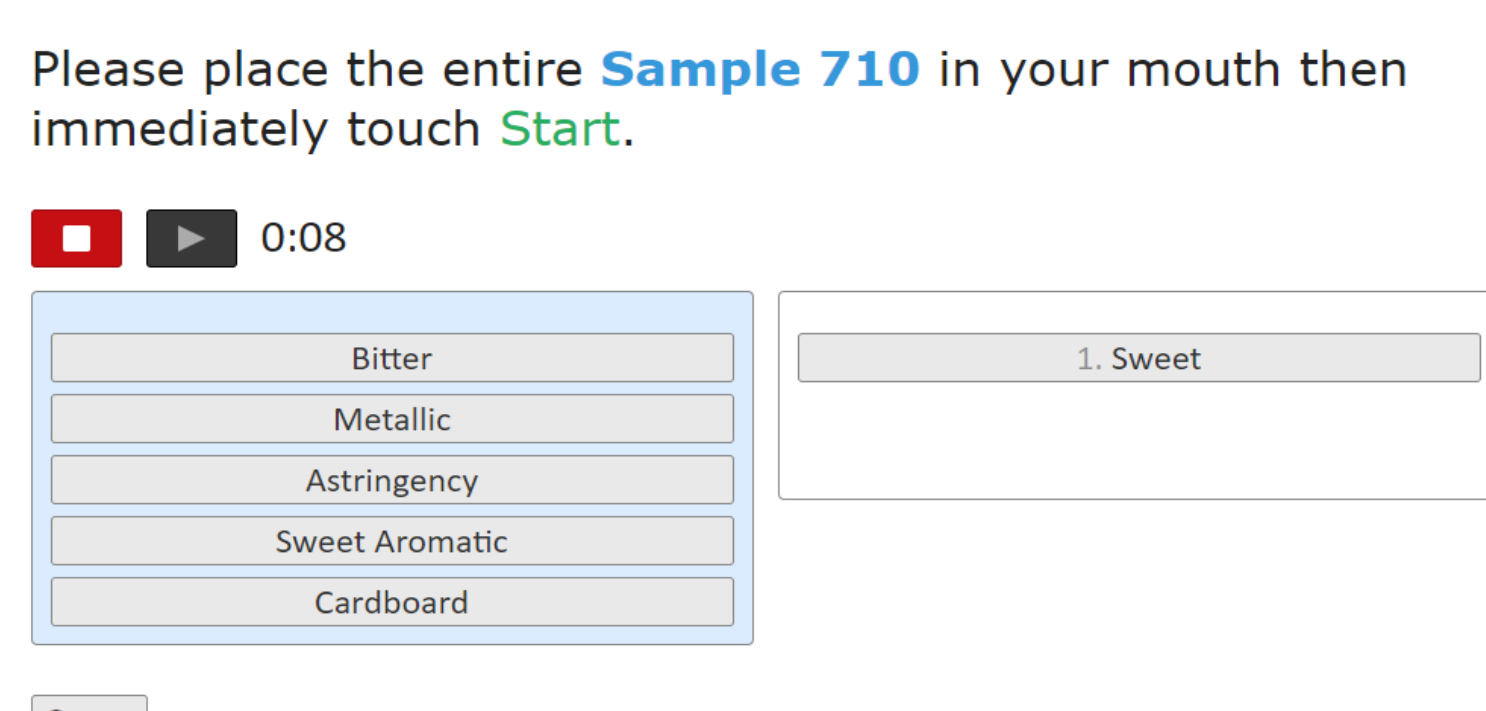


Figure 1. Screenshot of temporal ranking interface taken from Compusense Cloud. Figure shows the panelist currently has ranked only 1 attribute (sweet) shown on the right.

- For TCATA, panelists were presented a sample, asked to place the entire sample in their mouth, press Start, and then asked to select all attributes present until the end of the sample evaluation. (figure 2).

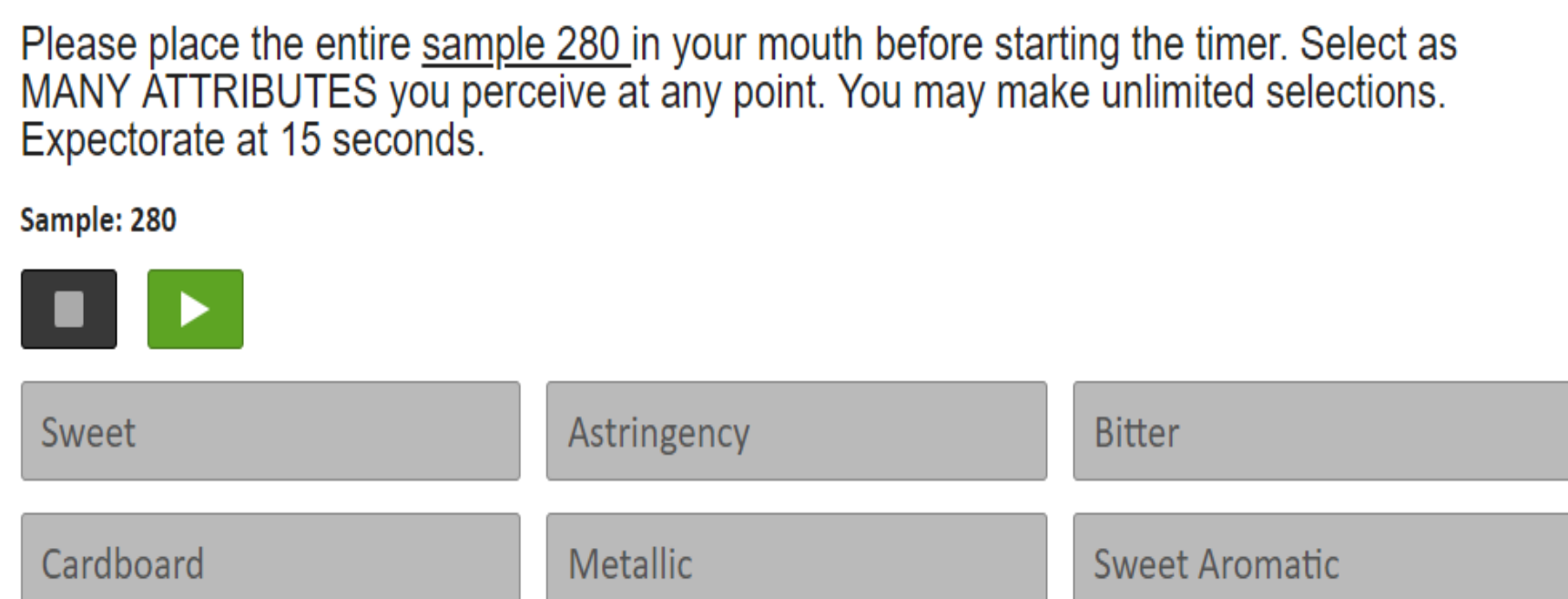


Figure 2. Screenshot of temporal check all that apply interface taken from Compusense Cloud

- Friedman test per treatment and time slice, followed by an exact all-pairs comparisons test. Statistical significance was determined at p-value <0.05.

Results and Discussion

- Overall, results from the TR method exhibited greater ability to differentiate protein beverage formulations than the TCATA method, although both methods consistently detected similar differences.
- TCATA citation rate did not show any significant differences between sucralose and sucrose protein beverages (figure 3); however, results from TR method indicated significantly higher dominance of sweet taste and metallic mouthfeel for sucralose and higher dominance for sweet aromatic for sucrose control (figure 4).
- When beverages were assessed using TCATA, stevia beverages exhibited higher citation proportions for sweet taste, bitter taste and metallic mouthfeel, compared to sucrose control (figure 5). TR method produced these findings as well, but additionally displayed significantly higher dominance of cardboard and sweet aromatic attributes for the sucrose control (figure 6).

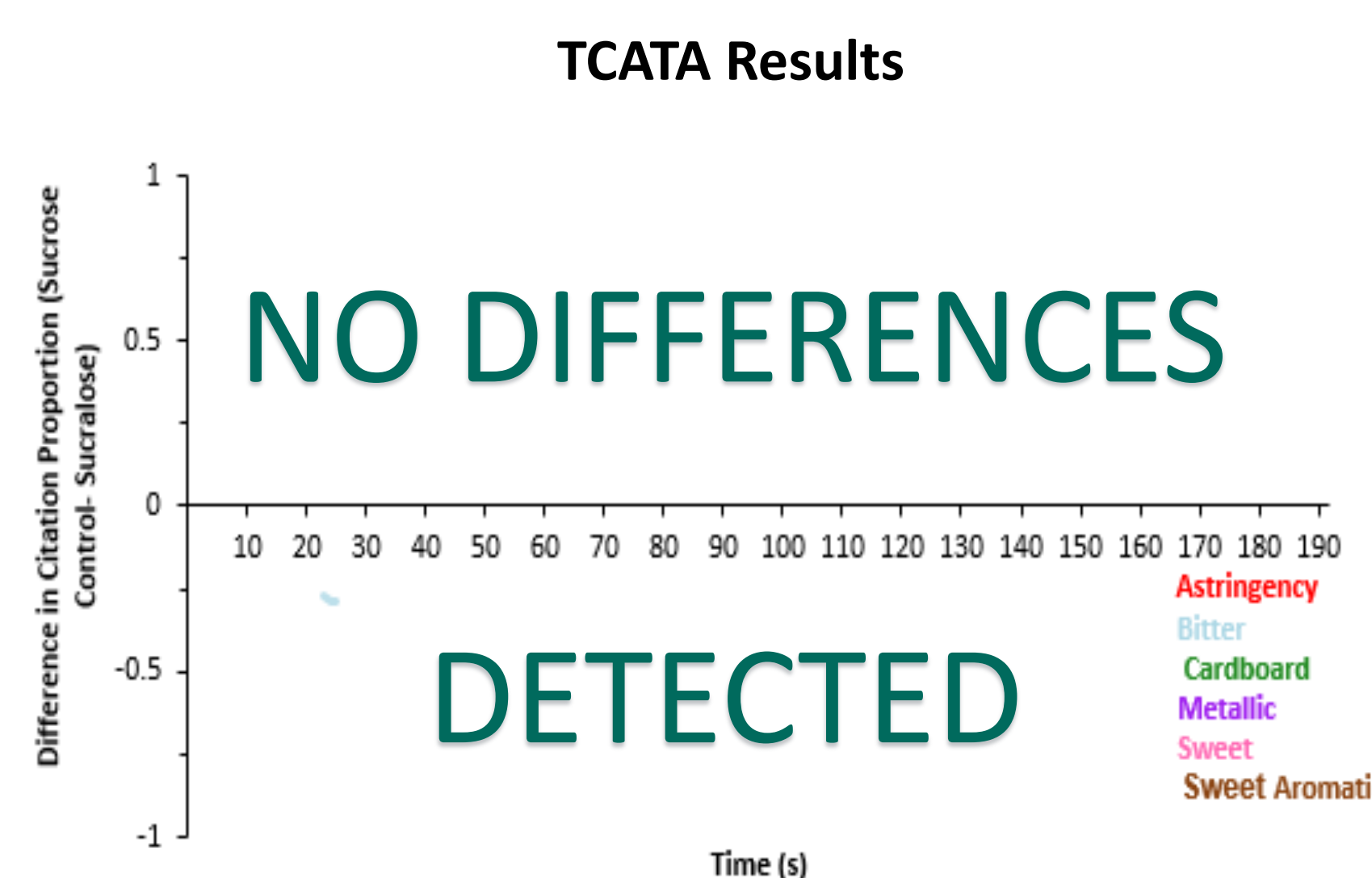


Figure 3. Difference in citation proportion between RTM protein beverages sweetened with sucrose (control) compared to sucralose

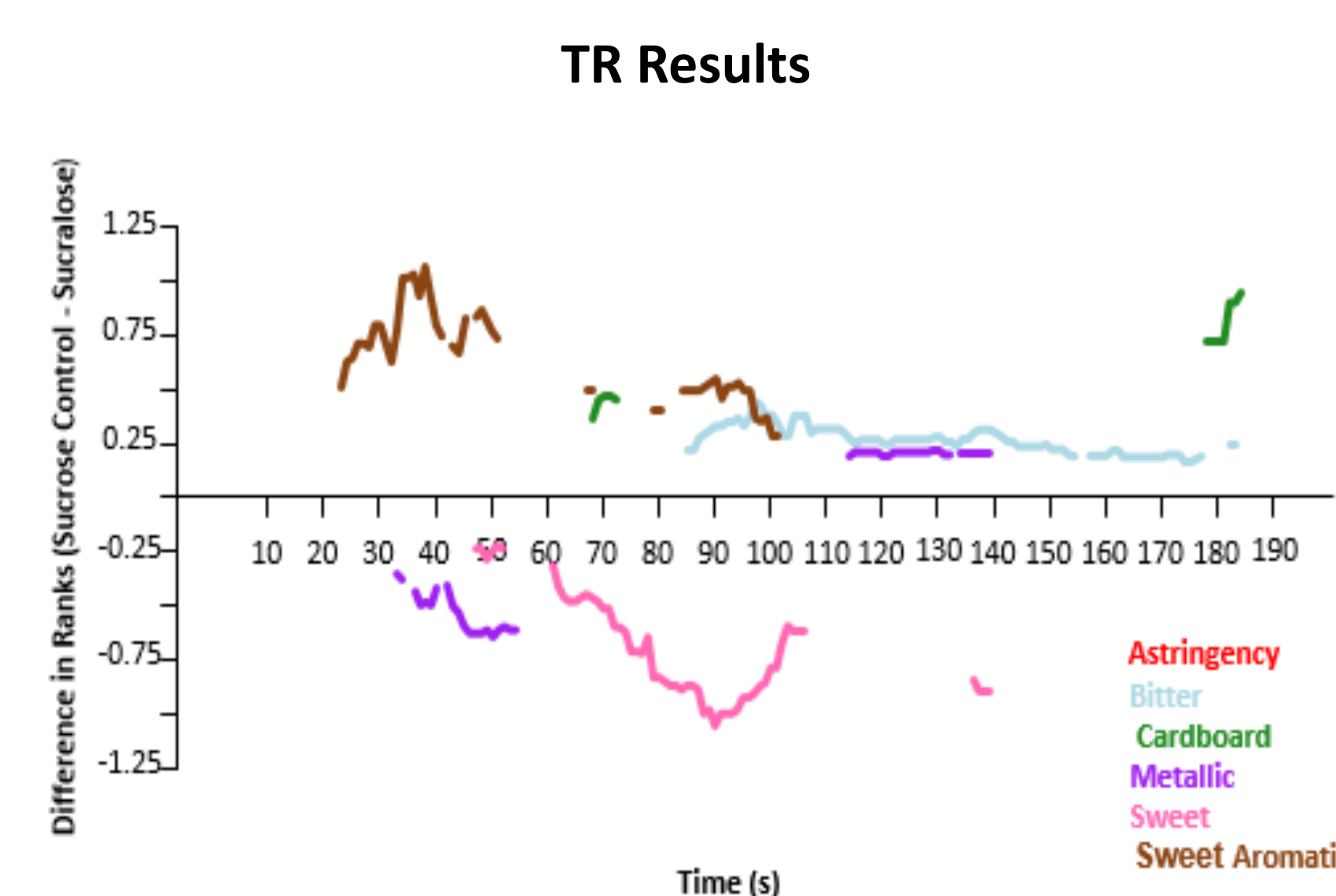


Figure 4. Difference in ranks between RTM protein beverages sweetened with sucrose (control) compared to sucralose

Conclusion

- In summary, TR was more sensitive in detecting temporal sensory differences in protein beverages with different sweeteners and sweetener blends than TCATA.
- Further application of findings and methodologies from this study may help guide development and formulation of foods.

Additional Figures

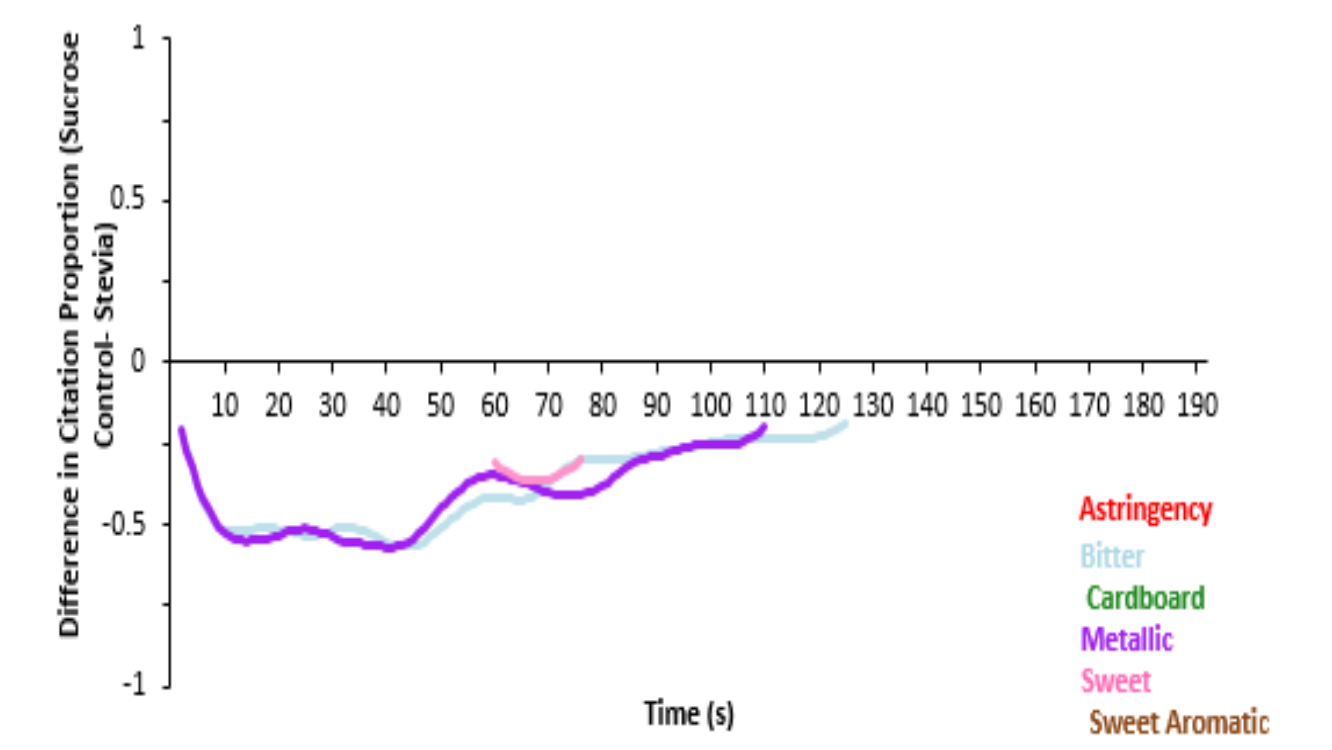


Figure 5. Difference in citation proportion between RTM protein beverages sweetened with sucrose (control) or stevia

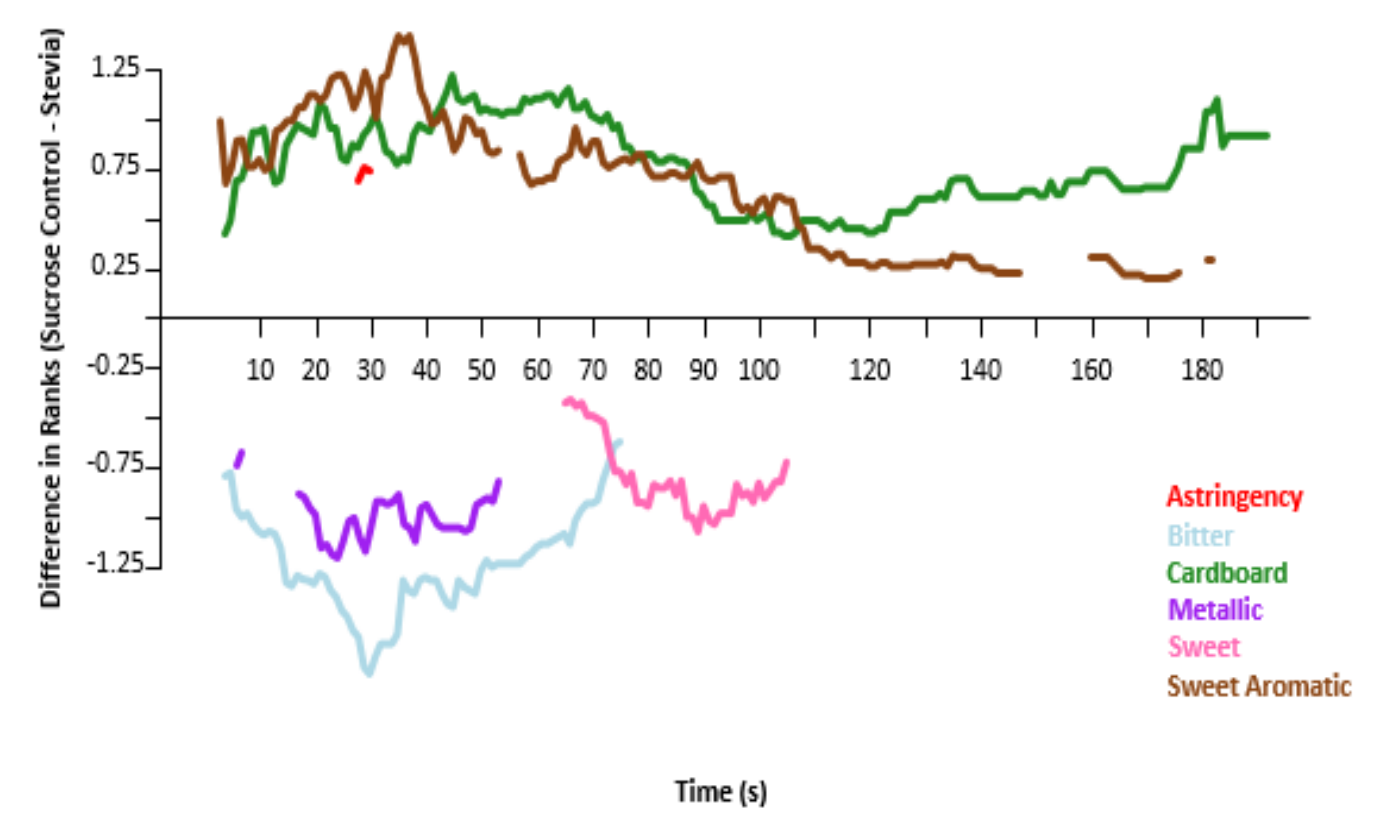


Figure 6. Difference in ranks between RTM protein beverages sweetened with sucrose (control) compared to stevia

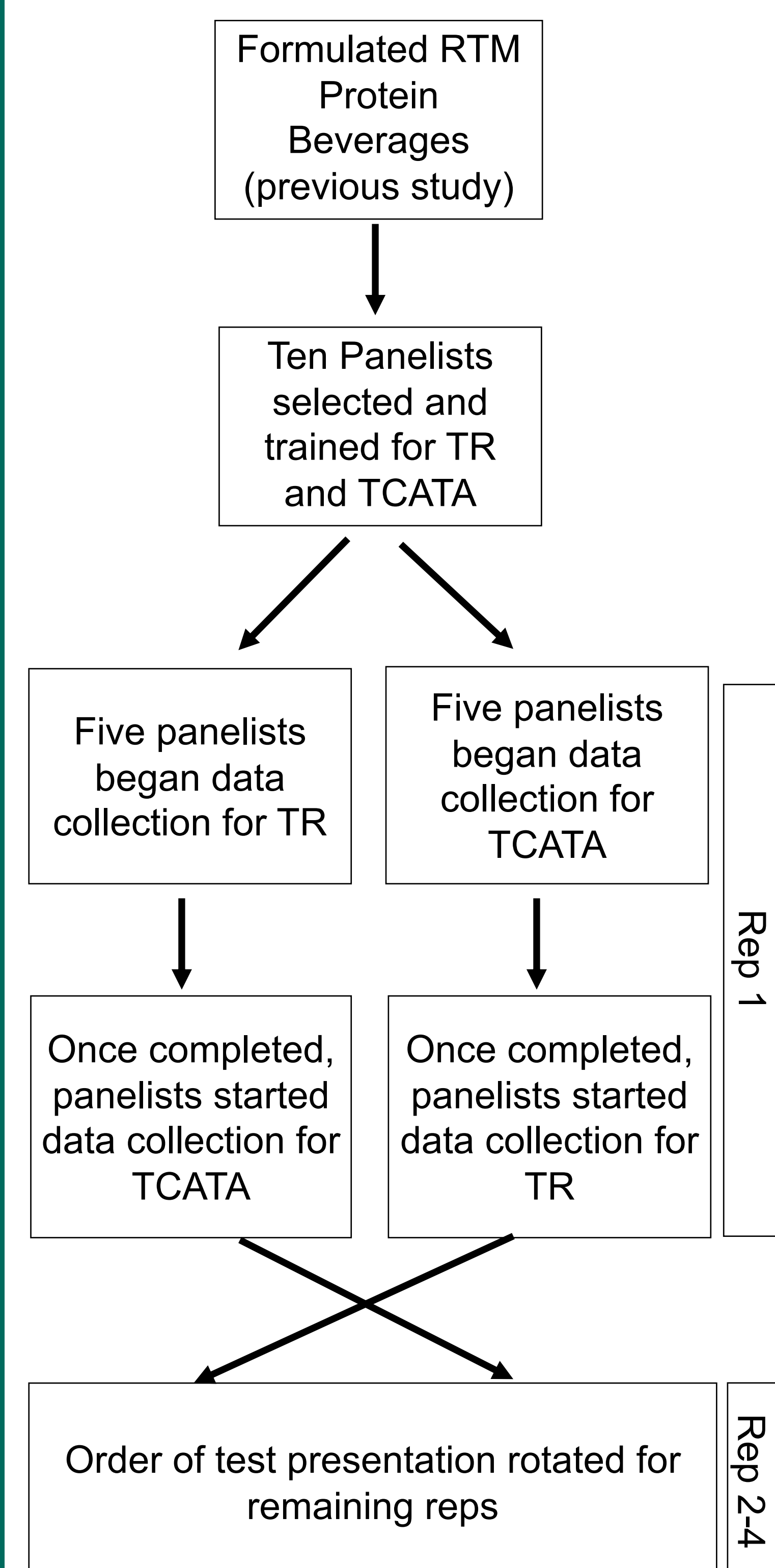


Figure 7. Flow diagram of experiment showing methods (TR and TCATA) allocated to assessors by experimental design.