

Measuring optimal sweetness-sourness in lemonade

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Introduction:

- The demand for healthier food and drink (lower sugar content, sugar replacement, etc.) is increasing. This trend prompts the need for an effective sensory testing tool to ensure the fine tuning of products without compromising the sensory merits of healthy food and beverage.
- The current just- about- right scales evaluate relative-to-ideal sweetness and relative-to-ideal sourness separately; there is no measure of the balance between them.
- We proposed a new just right sweetness-sourness balance scale that focuses on the balance of two attributes (sweetness and sourness) in a product (lemonade).

Objective:

To determine whether the proposed two-attribute just right balance scale is a better tool to predict the overall liking and the optimal value of an ingredient in comparison with the traditional single attribute just-about-right scale, such as the just right sweetness scale when applied to lemonade.

Results:

- The sensory study participated by 46 panelists showed that the proposed combined balance just right scale (“too much sour” at one end, “too much sweet” at the other end, and “just right” balance in the center) was more sensitive to the overall liking rating.
- The relationship of the mean ratings of the scales and the overall liking score are shown in Figure 1. The slope of the mean ratings of the balance just right scale is steeper than that of the single sweetness scale.
- In the most highly rated score of 70 to 80, the mean rating range of the balance scale is narrower than that of the sweetness scale (-8 to 22 vs. -15 to 25).

Extension:

This preliminary study shows the potential value of the proposed balance scale. Full scale study involving a larger group of panelists is recommended to fully evaluate the feasibility of this tool. The proposed two-attribute just right scale may also find usage in other sensory fields besides sweetness-sourness.

The proposed balance (two-attribute) just right scale was more sensitive in determining overall liking in lemonade than the sweetness (one-attribute) only just-about-right scale

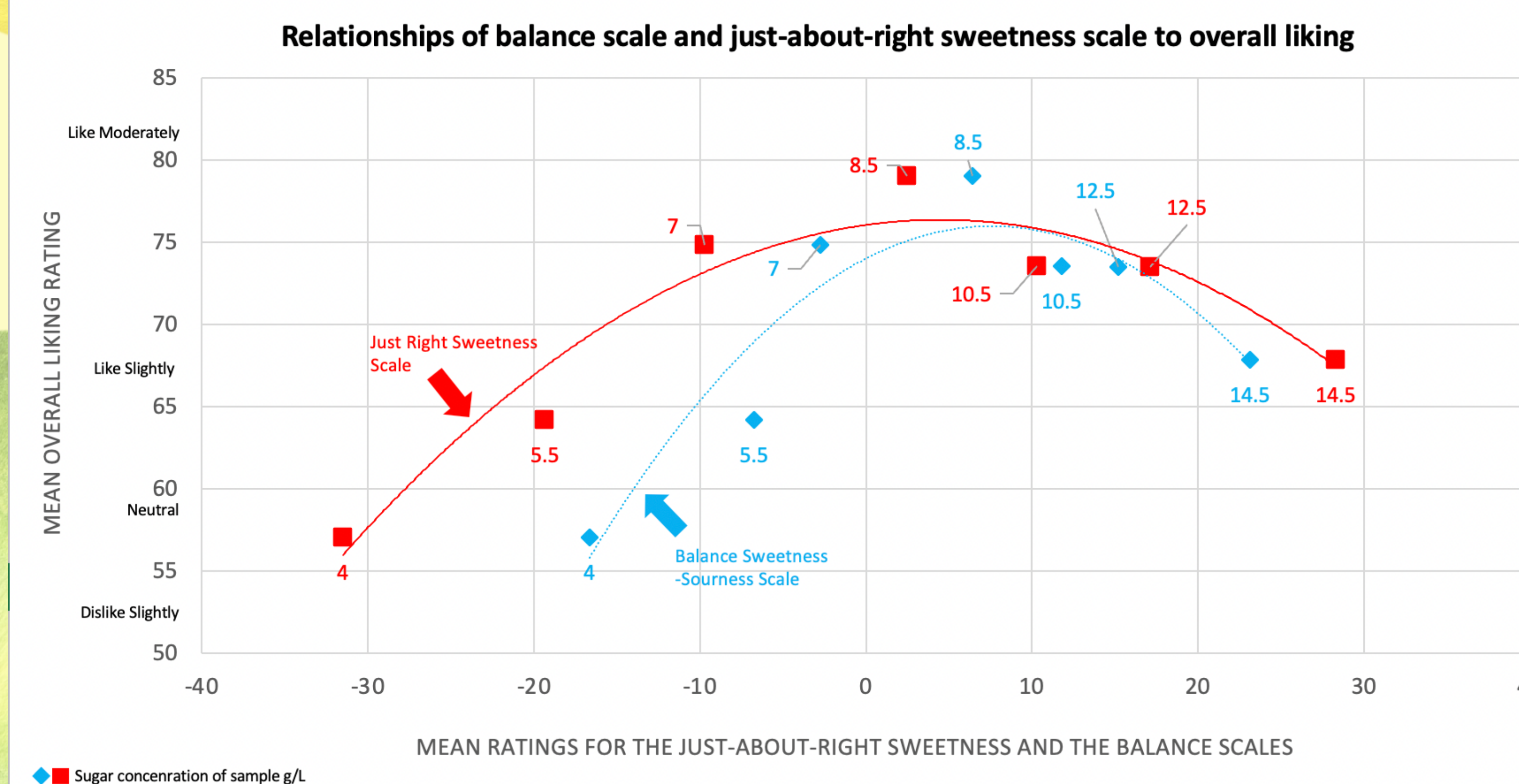


Fig. 1 This plot shows the mean values of the just-about-right sweetness ratings (in red) and the balance ratings (in blue) vs. the overall liking ratings (ordinate) of lemonade with sugar concentrations ranging from 4 – 14.5 g/l. The sugar concentration corresponding to each point is shown next to the point (diamond for balance scale, square for sweetness scale). The blue dotted line shows the quadratic trend of the balance scale in regard to the overall liking rating. The red solid line shows the quadratic trend line relating the just-about-right sweetness ratings to the overall liking ratings. The sweetness and balance scales were 150 mm in length; zero indicates the "just right point"; the lowest possible value was -75 and the highest possible value was 75. The overall liking scale (y-axis) ranged from "greatest imaginable disliking" (0) to "greatest imaginable liking" (120) with "neutral" at 60.

Materials and Methods:

Participants:

Forty-six panelists (untrained)

Products:

- Kool-Aid® Unsweetened Drink Mix Lemonade, Natural Flavor (Kraft Heinz Foods Company, Chicago, IL 60601)
- Domino® Premium Pure Cane Granulated Sugar (Domino Foods Inc)
- Distilled Water

Sample Preparation:

Seven bulk lemonade samples with the sugar content at 4, 5.5, 7, 8.5, 10.5, 12.5 and 14.5 g/L were made using 2.05 g of Kool-Aid powder (according to Kool-Aid's recommendation) and variance amount of sugar and water.

Order of Testing:

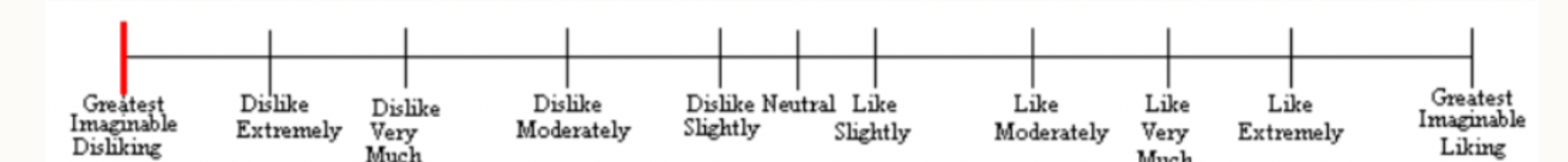
The testing order of samples for each panelist was determined by Williams Lab Square to reduce carry over effects.

Testing Method:

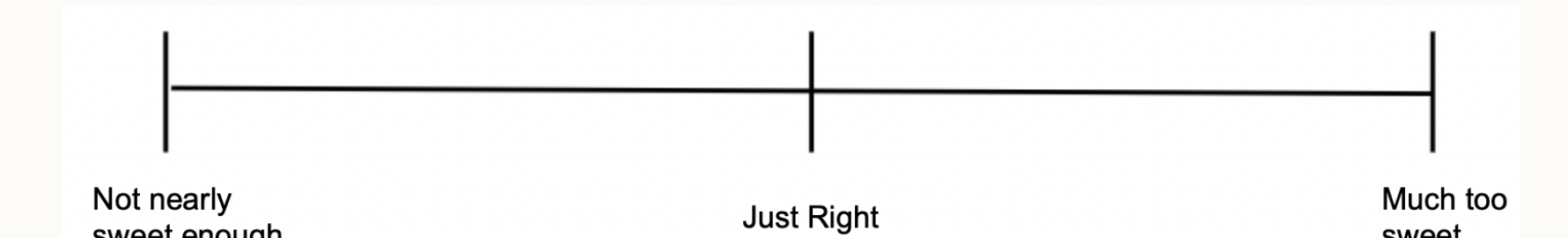
Sip test of 10 ml of sample: Panelists were instructed to place the entire contents of each lemonade sample in their mouths to evaluate and asked to rate on various scales.

Experimental Procedure:

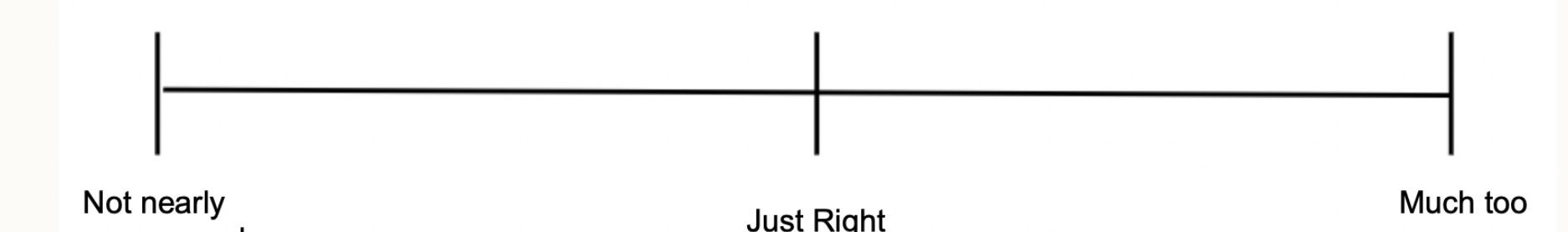
- 1) Panelists sip 10mL of sample
- 2) Panelists first rated their overall liking of the sample



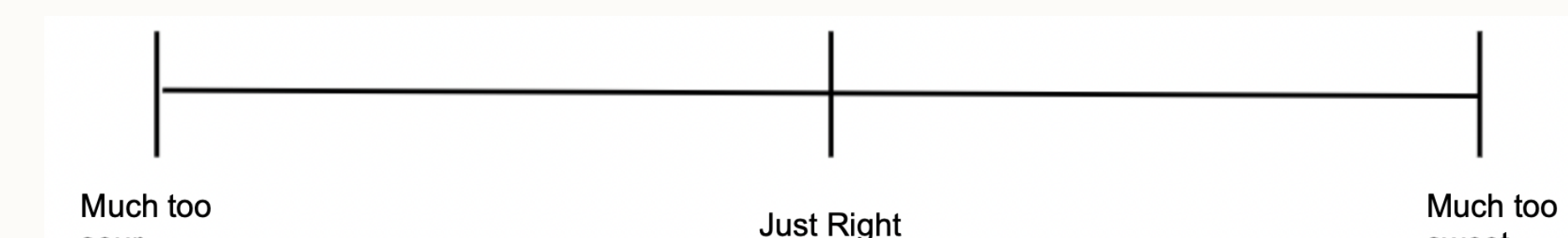
- 3) Panelists evaluated and rated the sweetness of the sample on a just- about-right sweetness scale



- 4) Panelists then evaluated and rated the sourness of each sample on a just- about- right- sourness scale



- 5) Panelists then evaluated the balance of sweetness-sourness in the samples on the proposed balance scale



- 6) Panelists repeated steps 1-5 for all 7 samples of lemonade

Acknowledgements:

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