Understanding how oro-sensory cues can influence food intake: learnings for future food design

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Background:
Sensory perception and food intake

By the age of 21 years old, the average person will have consumed approximately 23,000 meals.

Through repeated exposure, we learn to associate oro-sensory food experiences with post-ingestive satiety, helping us manage food intake.

Pre-meal
- A food’s odour and visual properties influence preference and portion selection.
- Odours stimulate sensory specific appetites and direct choice towards certain foods.
- Learned associations between sensory cues and experience inform portion selection.

Within meal
- Texture informs bite size and eating rate.
- Taste provides feedback on nutrient density.
- Visual cues provide feedback on amount consumed.

Meal to meal
- Repeated consumption of the same food establishes learnt associations between sensory cues and anticipated feeling of fullness.

Post-meal
- Satisfaction is associated with the sensory experiences during the meal and the amount consumed.

Case Study: Oral nutritional supplements as a model system for studying relationship between oro-sensory cues & intake

Why Oral Nutritional Supplements?

- 45% of French consumers are prepared to change their lifestyle to be healthier
- 88% of nutritional drink buyers in the US say that products in the category help them maintain a healthy lifestyle
- 21% of Canadians buy nutritional drinks/mixes

Base: France: 1,000 internet users aged 16+ 2017Q4; US: 983 internet users aged 18+ who have purchased nutritional and/or performance drinks in the past 3 months, February 2016; Canada: 2,000 internet users aged 18+, July 2017

Source: Europe: Lightspeed/Mintel; US: Lightspeed/Mintel; Canada: Lightspeed/Mintel
Background: Consumers Embrace Functional Products

79% prefer to consume health-enhancing ingredients through foods or beverages.¹

60% say they actively use foods and beverages to improve their health.²

73% of consumers report taking supplements at least once per week or more.³

Background:
Not all age brackets have the same need states

40-49 year old: Stay healthy & active
50-59 year old: Help with changing abilities
60-69 year old: Manage at least 1 illness
70-79 year old: Help with health issues and acute illness
80+ year old: Help with fragility and loss of independence
Sensory Insights: Understanding the Reasons for Consumption of Nutritional Supplements

Do we consume beverages just for their taste? What 'state of mind (-body)' are consumers trying to achieve when we consume a beverage and how can we determine this?

The main driver for consuming traditional nutritional supplements is not taste.

However, sensory cues can affect intake and ultimate benefit of consumption.

Sensory Insights: Current Challenges

- Effectiveness of supplements depends on adequate intake
- Adherence as low as 37%, wastage 24 - 63%
- Taste and texture cues have been reported as possibly product related factors impacting adherence
Sensory Insights: Understanding Challenges

✓ Oro-sensory cues such as high sweetness and thickness intensities may impact intake
✓ Reported associations between sweetness intensity and:
  ✓ Nutrient signalling and satiety
  ✓ Palatability and intake

✓ More viscous (thick) products are generally consumed slower, which may lead to higher oro-sensory stimulation, trigger satiety response and lower intake
Coming up with a solution

Sensory Study: The design

Sweetness
- Low
- High

Viscosity
- Thin
- Thick

Nutritional Beverage

Expert Panel

Consumers
Coming up with a solution
Sensory Study: The process

Start
Participants fast from 11:00 pm the evening before

9.00 am: Breakfast

10.00 am: Test product (ad libitum)

11.00 am-12.30 pm: Online questionnaire every half hour

Appetite (—) and sensory (---) ratings

Finish
Participants report lunch intake
Coming up with a solution

Sensory Study: Expert panel findings

Sweetness level affects perceived vanilla intensity

Thickness affects perceived sweet taste intensity
Coming up with a solution
Sensory Study: Consumer findings

Appetite

Intake

Lower thickness increased intake without affecting, hunger, desire to eat, fullness or prospective consumption
Key Learnings

1. Sensory cues act synergistically. Altering one can affect the perception of another.

2. Oro-Sensory cues of an oral nutritional supplement can affect satiation, satiety and overall food intake.

3. Better understanding of food perception can help the industry influence food intake by consumers helping them make healthier choices.
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