SSP Symposia
Advancing Sensory Science by Integrating Perceptual, Cognitive and Behavioral Psychology

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The Variation of Ingredient Reactions due to the Context of Food Applications

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Consumer needs are shifting in a way never experienced before. How do we design taste and deliver well-being in this brave new world?
Re-Imagine Natural™

Natural, organic and label-friendly taste design-crafted to address the increased desire for trust, transparency, and health
2016 Online Consumer Research
Food Label Attitudes Survey
United States, Germany, China and Turkey
71% of consumers believe NATURAL FLAVORS are SUITABLE for CONSUMPTION.

### Ingredient Label Suitability
Online Survey - of consumers that read food labels

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Suitable for consumption</th>
<th>Undesirable for consumption</th>
<th>Unfamiliar but feel it is SAFE</th>
<th>Unfamiliar but think it is UNSAFE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salt</td>
<td>66%</td>
<td>25%</td>
<td>6%</td>
<td>3%</td>
</tr>
<tr>
<td>Sodium Chloride</td>
<td>28%</td>
<td>30%</td>
<td>21%</td>
<td>20%</td>
</tr>
<tr>
<td>Natural Flavors</td>
<td>71%</td>
<td>11%</td>
<td>14%</td>
<td>4%</td>
</tr>
<tr>
<td>Artificial Flavors</td>
<td>16%</td>
<td>56%</td>
<td>14%</td>
<td>14%</td>
</tr>
<tr>
<td>Enzymes</td>
<td>43%</td>
<td>21%</td>
<td>25%</td>
<td>11%</td>
</tr>
<tr>
<td>Sodium Benzoate</td>
<td>9%</td>
<td>27%</td>
<td>24%</td>
<td>41%</td>
</tr>
<tr>
<td>Monosodium Glutamate (MSG)</td>
<td>16%</td>
<td>35%</td>
<td>23%</td>
<td>25%</td>
</tr>
</tbody>
</table>
Voice of the Consumer
CLE™ Ingredient Scoring Methodology

For each category, consumers select moments and specific example products that apply to them in that moment.

CLE members are invited to complete an ingredient survey and screened for category usage.

Participants are instructed to select “OK” or “Avoid” to describe their feeling toward each ingredient tested.

Ingredient survey results are captured in the database with multiple views available in the dashboard.
Thinking about a typical/normal breakfast at home before heading out for the day, when you are eating Cereal (hot or cold), how do you feel about the following ingredient: **STEVIA**

- OK
- AVOID

**Implicit Behavioral Measures**
- % Avoid and Time to Respond
Data Treatment of Response Times

Each participant gets their own, personal cutoff time for what is “fast”

Today we will be using a question style which monitors how fast you answer. The next set of questions will help us personalize the questions for you.

Please pick three numbers and remember which three you picked.

- One
- Two
- Three
- Four
- Five
- Six
- Seven
- Eight
- Nine
- Ten

Was this one of the three numbers you picked?

One

Yes  No
Calculation of the Clean Label Score™

Implicit - System 1 Response

Fast/Avoid
(weight -1)

Fast/OK
(weight 1)

Explicit - System 2 Response

Slow/Avoid
(weight -0.5)

Slow/OK
(weight 0.5)
Calculation of the Clean Label Score™
Calculation of the Clean Label Score™

<table>
<thead>
<tr>
<th>Time to Respond</th>
<th>Implicit - System 1 Response</th>
<th>Explicit - System 2 Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fast</td>
<td>Fast/Avoid (weight -1)</td>
<td>Slow/Avoid (weight -0.5)</td>
</tr>
<tr>
<td>Slow</td>
<td>Fast/OK (weight 1)</td>
<td>Slow/OK (weight 0.5)</td>
</tr>
</tbody>
</table>
Insights Through Access
Quick, Custom Clean Label Consumer Reports

Clean Label Score Comparisons
- Food Categories
- Moments of Use
- Demographic Segments
- Custom Segments
- Shopper (Retailer) Targets

Other Views
- Clean Label Score Distributions
- Clean Label Scores Drill Downs
- Implicit Measures
- Products Selected
- Claim Influence
- Category Moment Statements
- Comments on Brands

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Context matters...

Error is introduced if you are not controlling for it
For ingredients the most concerning context effect is the compromise effect which means that acceptability of different ingredients change based on the context within which they are seen.
CLE™ Scores for Flavor Enhancers

Salt vs. Sodium Chloride

Ingredients

- Sea Salt
- Mineral Salt
- Smoked Sea Salt
- Salt
- Potassium Salt
- Autolyzed Yeast Extract
- Sodium Chloride
- Disodium Guanylate
- Disodium Inosinate
Same Ingredient Set Across Different Need State Moments

<table>
<thead>
<tr>
<th></th>
<th>Soups Comfort</th>
<th>Soups Convenience</th>
<th>Soups Health</th>
<th>Soups Nourishment</th>
<th>Soups Pleasure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chicken Stock</td>
<td>86.41 A</td>
<td>94.19 A</td>
<td>82.78 A</td>
<td>83.72 A</td>
<td>88.33 A</td>
</tr>
<tr>
<td>Natural Chicken Flavor</td>
<td>84.78 A</td>
<td>84.88 A</td>
<td>72.78 A</td>
<td>75.00 A</td>
<td>78.89 A</td>
</tr>
<tr>
<td>Organic Chicken Flavor</td>
<td>78.26 A</td>
<td>77.33 A</td>
<td>62.78 AB</td>
<td>73.26 A</td>
<td>73.89 A</td>
</tr>
<tr>
<td>Chicken Bouillon</td>
<td>72.83 A</td>
<td>79.65 A</td>
<td>66.11 AB</td>
<td>66.28 A</td>
<td>71.67 A</td>
</tr>
<tr>
<td>Chicken Fat</td>
<td>42.39 B</td>
<td>48.84 B</td>
<td>52.22 B</td>
<td>42.44 B</td>
<td>43.33 B</td>
</tr>
<tr>
<td>Overall Mean</td>
<td>72.93</td>
<td>76.98</td>
<td>67.33</td>
<td>68.14</td>
<td>71.22</td>
</tr>
<tr>
<td>Unique Resp.</td>
<td>46</td>
<td>43</td>
<td>45</td>
<td>43</td>
<td>45</td>
</tr>
<tr>
<td>P-value</td>
<td>&lt;0.0010</td>
<td>&lt;0.0010</td>
<td>&lt;0.0051</td>
<td>&lt;0.0010</td>
<td>&lt;0.0010</td>
</tr>
</tbody>
</table>

**Trade-offs** consumers make for convenience vs. health

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As with most things, **who** you ask matters, the acceptability of an ingredient may change, based on the context of the consumer demographic you are asking

-education level
-region of the US
-age/generation
-gender
Salts by Education

Sodium Chloride scores- education effect

[Bar chart showing scores for Potassium Salt, Sea Salt, Smoked Sea Salt, Sodium Chloride, and Average Score (Across Column Selection) for different levels of education: Doctorate, Masters, Law or professional degree; College graduate; High school graduate or GED; Some college/Technical school/Associates Degree.]

- Potassium Salt: [Scores for each level of education]
- Sea Salt: [Scores for each level of education]
- Smoked Sea Salt: [Scores for each level of education]
- Sodium Chloride: [Scores for each level of education]
- Average Score (Across Column Selection): [Scores for each level of education]
Sweeteners by Region

But sweetener scores do!

- Beet Sugar
- Golden Brown Cane Sugar
- Molasses
- Sorbitol
- Average Score (Across Column Selection)

Legend:
- Midwest
- Northeast
- West
- South
Beyond demographics, the acceptability of an ingredient may change, based on the context of consumer values
IFF’s Choice Segmentation Model

Global Segmentation Model Based on Consumer Values

- Increases efficiency and our ability to recommend the types of flavors that are appealing to segments of consumers
- Complements traditional models
- Modular - lends to combining techniques
- Helps to identify white space in product portfolios

We Understand Macro Cues for Each Segment

Choice Increases Our Ability to Deliver Relevant Flavors

- By Brand
- vs. Occasion or Need
Salts by IFF Choice™ Segment

Scores show no context dependency by IFF Choice™, mostly Super Achievers and Control Freaks
The acceptability of an ingredient may change, based on the context of shopping habits/preferred retailer.
Sweeteners by Retailer

Sweetener scores show context effect by retailer

- Agave
- Beet Sugar
- Average Score (Across Column Selection)

- Whole Foods
- Trader Joe’s
- Aldi
- Target
- Wal-Mart
- Kroger

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Key Takeaway

Assessing **sys 1/sys 2** thinking and controlling for **context** in the research design adds a new dimension of insight that can help companies make **better clean label decisions**.
Beautiful answers start with brave questions.

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