**How Product Type and Organic-Label Structure Combine to Influence the Consumers’ Evaluations of Organic Foods**

**Web Appendix**

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**Study WA-1: “Healthy” and “Raw/Unaltered” are Central Features of Organic Foods**

**Method**

The objective of this study was to examine the extent to which various features are central to consumers’ organic-food concepts. The study was done online on Amazon Mechanical Turk (N= 67). Six of these participants were dropped due to evidence they merely “clicked through” the survey: their responses showed very low aggregate, cross-item variance—1.5 standard deviations below the mean—despite reverse-coded questions, leaving a final sample size of 61. The results are very similar, but unsurprisingly noisier, if these responses are included in the analysis.

*Table WA-1: Study WA-1 Questions and Features*

|  |  |
| --- | --- |
| **Questions** | |
| 1. How surprised would you be to encounter an organic food that is *not* \_\_\_\_\_\_\_\_\_\_? (r)   [1 = not at all, 9 = very surprised] | |
| 1. How easily can you imagine an organic food that is *not* \_\_\_\_\_\_\_\_\_\_?   [1 = not at all, 9 = very easily] | |
| 1. How good an example of an organic food would you consider an organic food that is *not* \_\_\_\_\_\_?   [1 = very poor example, 9 = very good example] | |
| 1. How similar is an organic food that is *not* \_\_\_\_\_\_\_\_\_\_ to an ideal organic food?   [1 = not at all, 9 = very similar] | |
| 1. What percentage of organic foods are \_\_\_\_\_\_\_\_\_\_?   [0-100] | |
| **Features (Cronbach’s *α*)** | |
| Healthy (*α* = .829) |  |
| Fresh (*α* = .638) | Processed (*α* = .870) |
| Simple (*α* = .748) | Complex (*α* = .800) |
| Expensive (*α* = .486) | Flavorful (*α* = .697) |
| Grown/raised on a farm (*α* = .747) | A prepared dish (*α* = .770) |

*\*note – Question 1 was reverse-coded for analysis. The Cronbach’s alphas are for the first four questions for each feature. Question 5 was analyzed separately because it used a different scale.*

Participants were asked how central they felt nine features were for the organic-food concept. These nine features were chosen based on previous research on organic foods and intuitions of the authors, with the goal to be as inclusive and comprehensive as possible. This was done by asking five questions adapted from Sloman et al. (1998) for each of the nine features (i.e., 45 questions in all). The five questions and the nine features that were examined are presented in table WA-1. Participants answered the five questions in the same order for all features, the order in which they were presented with features was randomized, eliminating any concerns about order effects.

**Results**

* Responses to Qs 1 through 4 (after reverse-coding Q1) were averaged to form a single centrality score for each feature. Note that reverse coding Q1 (as opposed to Qs 2-4) establishes that lower numbers indicate greater centrality.
* The average across respondents for each measure was then compared to the midpoint of the scale (=5).
* Four features—healthy, farm raised/grown, fresh, and expensive—are significantly lower than the scale midpoint (=5) and, thus, have a high degree of feature centrality for the organic-food construct.
* Three features—complex, a prepared dish, and processed—are all significantly higher than the scale midpoint (=5) for the centrality score and below the sale midpoint (=50) for the Q5 categorization question. Thus, none of these features are considered central to the organic food concept and, in fact, might very well be considered antithetical to the concept for many.
* One feature—flavorful—is not significantly different from the midpoint and, thus, is not central to the organic food concept. Another feature—simple—is moderately significantly lower than the scale midpoint, indicating it has a moderate degree of feature centrality.

*Table WA-2: Study WA-1 Feature Centrality Results*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Feature** | **Centrality Score**  **Mean (SD)a** | ***t*** | ***p*** | **Q5 mean %**  **(SD)b** | ***t*** | ***p*** |
| Healthy | 3.37  (1.99) | -6.41 | .000 | 76.72  (22.58) | 9.25 | .000 |
| Farm | 3.45  (1.75) | -6.92 | .000 | 68.97  (26.77) | 5.53 | .000 |
| Fresh | 3.67  (1.64) | -6.34 | .000 | 74.41  (20.93) | 9.11 | .000 |
| Expensive | 4.51  (1.46) | -2.61 | .011 | 77.84  (14.91) | 14.58 | .000 |
| Simple | 4.58  (1.79) | -1.84 | .071 | 64.52  (21.23) | 5.34 | .000 |
| Flavorful | 4.74  (1.65) | -1.24 | .219 | 61.00  (23.09) | 3.72 | .000 |
| Complex | 6.32  (2.02) | 5.13 | .000 | 40.30  (26.62) | -2.85 | .006 |
| Prep. Dish | 6.66  (1.75) | 7.38 | .000 | 35.74  (22.65) | -4.92 | .000 |
| Processed | 7.36  (1.86) | 9.93 | .000 | 39.90  (31.13) | -2.53 | .014 |

*a tested against scale midpoint (=5) with lower values indicating greater feature centrality,*

*b tested against scale midpoint (=50) with higher values indicating greater feature centrality*

*c question1 has been reverse-coded*

As a final analysis, we directly contrasted the results for the composite centrality score and Q5 categorization question for the two pairs of features that represent the end-points of two spectrums: (1) fresh-processed, and (ii) simple-complex. As the above results imply, “simple” had a significantly lower composite centrality score than “complex” (*t* = -4.30, *p* = .000) and a significantly higher Q5 categorization score (*t* = 4.81, *p* = .000), both indicating that “simple” is considered to be a far more central feature to the organic food concept than “complex.” Likewise, “fresh” had a significantly lower composite centrality score than “processed” (*t* = -10.29, *p* = .000) and a significantly higher Q5 categorization score (*t* = 6.53, *p* = .000), both indicating that “fresh” is considered to be a far more central feature to the organic food concept than “processed.”

**References**

Sloman, S. A., Love, B. C., & Ahn, W. K. (1998). Feature centrality and conceptual coherence. *Cognitive Science*, *22*(2), 189-228.

**Study WA-2: Further Evidence “Healthy” and “Raw/Unaltered” are Central Features**

**Method**

The objective of this study is to show that the ingredients that comprise composite vice foods will, on average, be considered more typical of organic foods than will the composite foods themselves. In other words, the extent to which ingredients conform to organic-food concepts (due to each possessing the feature abstract, superordinate feature “raw/unaltered”) will not aggregate upward for composite vice foods. Such differences should be less apparent for composite virtue foods that, at a minimum, inherently conform to consumers’ organic-food concepts on at least the most central feature: healthiness. This experiment examined this prediction by asking AMT participants (N=100) to first evaluate the extent to which a specific composite dish (either a vice or a virtue dish) was typical of organic foods. Subsequently, participants were asked to make the same evaluations for 16 ingredients. Finally, participants were asked which of those ingredients they would expect to be ingredients in the composite dish they had previously evaluated. Participants also evaluated the healthiness of their respective dish and all the ingredients.

*Table WA-3: Study WA-2 Questions Participants were asked*

|  |
| --- |
| **Questions** |
| 1. How typical of organic foods is the following item\*?   [1 = not typical at all, 6 = very typical] |
| 1. How good an example of organic foods is the following item\*? [1 = very bad example, 6 = very good example] |
| 1. How healthy is the following item\*?   [1 = very unhealthy, 6 = very healthy]  (3) How heathy is the following item (1 = very unhealthy, 6 = very healthy) |

*\*Participants were randomly asked to answer these questions either for a Bacon Cheeseburger or a Grilled Chicken Sandwich. Subsequently, all participants then responded to the same three questions for 16 ingredients* (*tomato, beans, chicken, ground beef, bacon, cheese, avocado, green peppers, lettuce, bun, tortilla, ketchup, mustard, carrot, cucumber, onion)*

*Figure WA-1: Study WA-2 Organic-Foods Typicality Ratings*

*Note – Product (bacon cheeseburger vs. grilled chicken wrap) was manipulated between subjects. The extent to which the composite product (product rating) and its constituent ingredients (ingredients rating), as selected by the participant, were considered typical of organic foods are the repeated-measures typicality indices. The ingredients rating measure is the average typicality index for all ingredients included in the dish by the participant.*

**Results**

* “Typicality” and “goodness of example” measures for the dishes (r = .86) were combined into a single perceived-typicality score. The same was done for these two measures for each of the ingredients (minimum r = .64).
* The bacon cheeseburger was believed to be significantly less healthy (*M* = 1.84, *SD* = 1.27) than the grilled chicken wrap (*M* = 4.54, *SD* = .97; *F*(1,98) = 142.72, *p* < .001).
* The bacon cheeseburger was considered significantly less typical of organic foods (*M* = 1.78, *SD* = 1.17) than the grilled chicken wrap (*M* = 3.70, *SD* = 1.32; *F*(1,98) = 59.19, *p* < .001).
* There was no significant difference in typicality scores for any of the 16 ingredients between the vice and virtue conditions (smallest *p* = .11, for chicken).
* A mixed-model analysis that included product condition (vice vs. virtue) as the between-subjects factor, the repeated-measures typicality scores for (i) the dish and (ii) the (average of the) selected ingredients as the within-subjects factor revealed there was a significant interaction between the between-subjects factor, product-type (bacon cheeseburger vs. grilled chicken wrap), and the repeated-measures typicality scores for the composite products versus constituent ingredients (*F*(1,98) = 20.73, *p* < .001; figure WA-1).
* Most critically, the difference in typicality scores between the composite dishes and their constituent ingredients was greater for the bacon cheeseburger (Δ = 1.61, *SD* = 1.26; *t*(49) = 9.03, *p* < .001) than for the grilled chicken wrap (Δ = .54, *SD* = 1.06; *t*(49) = 3.48, *p* < .001).

Collectively, these results reveal two things. First, consumers perceive foods that are healthier to be more typical of organic foods. Second, consumers perceive ingredients, which are generally considered to be raw/unaltered components of composite foods, to also be more typical of organic foods. Foods that fail on both dimensions are considered highly atypical.

**Experimental Stimuli Pretest: Method and Results**

**Method**

We conducted a pretest to verify that the foods in our studies were perceived as we expected. Specifically, we expected that burgers (study 1a), burritos (studies 1b and 3), fajitas (study 1b), and nachos (study 2) would be considered composite vice foods. That is, participants should *not* perceive these foods as being unambiguously “healthy” or “ingredient-like.” In contrast, we expected that mixed salads (study 2) would be considered a composite virtue product, with participants perceiving mixed salads to be unambiguously “healthy” but not “ingredient-like.” To assess such perceptions, 63 AMT participants were asked two questions for each of these foods. (1) “How healthy is \_\_\_\_\_” (1 = healthy, 9 = unhealthy)? (2) “To what extent is \_\_\_\_\_ a single ingredient versus a composite dish made up of multiple ingredients” (1 = definitely a single ingredient, 9 = definitely a composite dish)?

**Results**

* All ratings were compared to the midpoint (=5) of both scales described above to test participants’ perceptions of foods.
* Ratings significantly below the midpoint indicate beliefs that the food is healthy and ingredient-like. Ratings significantly above the midpoint indicate beliefs that the food is unhealthy and not ingredient-like (i.e., is a composite dish). Any rating not significantly different from the midpoint would indicate meaningful ambiguity (i.e., uncertainty) about the extent to which the food is healthy and ingredient-like.
* None of the ostensible composite vice foods (burgers, burritos, fajitas, & nachos) have ratings significantly below the midpoint of the scale for either feature (table WA-3)
* Moreover, all ratings except one (the healthiness of fajitas) was significantly above the midpoint.
* In contrast, the mixed salad be rated significantly below the midpoint for healthiness, and significantly above the mid-point for being ingredient-like.

*Table WA-3: Food Stimuli Perception Results*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Food** | **Feature** | **Mean** | **Std. Deviation** | ***t\**** | ***p*** |
| Burgers | Healthy | 5.61 | 1.91 | 2.56 | .013 |
| Ingredient-like | 6.42 | 2.42 | 4.68 | .001 |
| Burritos | Healthy | 5.39 | 1.71 | 1.83 | .072 |
| Ingredient-like | 7.96 | 1.51 | 15.31 | .001 |
| Fajitas | Healthy | 5.00 | 1.89 | .00 | .99 |
| Ingredient-like | 8.11 | 1.76 | 13.95 | .001 |
| Nachos | Healthy | 6.12 | 2.25 | 3.96 | .001 |
| Ingredient-like | 6.90 | 2.44 | 6.14 | .001 |
| Mixed Salad | Healthy | 2.14 | 1.77 | -12.68 | .001 |
| Ingredient-like | 7.95 | 1.66 | 13.96 | .001 |

\* means were tested against the midpoint of the scale (=5)

**Study 3 Constructed/Deconstructed Food Image Stimuli**



**Table WA-4: Studies 1a and 1B ANOVA Tables (Likelihood of Ordering)**

*Study 1a*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Source** | **SS** | **df** | **MS** | **F** | **p** |
| *label* | *94.188* | *1* | *94.188* | *13.745* | *.000* |
| Error | 1322.561 | 193 | 6.853 |  |  |
| Total | 9649.00 | 195 |  |  |  |
| R Squared = .069 (Adjusted R Squared = .064) | | | | | |

*Study 1b*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Source** | **SS** | **df** | **MS** | **F** | **p** |
| *label* | *74.197* | *2* | *37.099* | *6.150* | *.003* |
| food | .280 | 1 | .280 | .046 | .830 |
| label \* food | 2.000 | 2 | 1.000 | .166 | .847 |
| Error | 1176.210 | 195 | 6.032 |  |  |
| Total | 8780.000 | 201 |  |  |  |
| a. R Squared = .061 (Adjusted R Squared = .037) | | | | | |

**Table WA-5.1: Study 2 ANOVA Table with Exclusions**

*Composite Evaluation Scores*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Source** | **SS** | **df** | **MS** | **F** | **p** |
| *label* | *70.934* | *1* | *70.934* | *15.124* | *.000* |
| vice/virtue | 6.457 | 1 | 6.457 | 1.377 | .242 |
| *v/v \* label* | *29.206* | *1* | *29.206* | *6.227* | *.013* |
| Error | 834.828 | 178 | 4.690 |  |  |
| Total | 7331.667 | 182 |  |  |  |
| a. R Squared = .114 (Adjusted R Squared = .099) | | | | | |

**Table WA-5.2: Study 2 ANOVA Table without Exclusions**

*Composite Evaluation Scores*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Source** | **SS** | **df** | **MS** | **F** | **p** |
| *label* | *84.976* | *1* | *84.976* | *18.803* | *.000* |
| vice/virtue | 1.639 | 1 | 1.639 | .363 | .548 |
| *v/v \* label* | *21.470* | *1* | *21.470* | *4.751* | *.030* |
| Error | 890.305 | 197 | 4.519 |  |  |
| Total | 8168.000 | 201 |  |  |  |
| a. R Squared = .106 (Adjusted R Squared = .092) | | | | | |

**Table WA-5.3: Study 2 Means by Condition (Composite Evaluation Scores) w/o Exclusions**

|  |  |  |
| --- | --- | --- |
| **Condition** | **Mean** | **Std. Deviation** |
| Nachos, Ingredient Label | 7.05 | 1.83 |
| Nachos, Product Label | 5.09 | 2.62 |
| Salad, Ingredient Label | 6.21 | 1.88 |
| Salad, Product Label | 5.57 | 2.08 |

**Table WA-6.1: Study 3 ANOVA Table with Exclusions**

*Composite Evaluation Scores*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Source** | **SS** | **df** | **MS** | **F** | **p** |
| *label* | *46.090* | *1* | *46.090* | *11.218* | *.001* |
| *image* | *57.449* | *1* | *57.449* | *13.983* | *.000* |
| *image \* label* | *14.842* | *1* | *14.842* | *3.613* | *.058* |
| Error | 1569.432 | 382 | 4.108 |  |  |
| Total | 14830.667 | 386 |  |  |  |
| a. R Squared = .068 (Adjusted R Squared = .061) | | | | | |

**Table WA-6.2: Study 3 ANOVA Table without Exclusions**

*Composite Evaluation Scores*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Source** | **SS** | **df** | **MS** | **F** | **p** |
| *label* | *50.299* | *1* | *50.299* | *12.140* | *.001* |
| *image* | *51.978* | *1* | *51.978* | *12.545* | *.000* |
| *image \* label* | *6.370* | *1* | *6.370* | *1.537* | *.216* |
| Error | 1769.162 | 427 | 4.143 |  |  |
| Total | 17076.778 | 431 |  |  |  |
| a. R Squared = .057 (Adjusted R Squared = .050) | | | | | |

**Table WA-6.3: Study 3 Means by Condition (Composite Evaluation Scores) w/o Exclusions**

|  |  |  |
| --- | --- | --- |
| **Condition** | **Mean** | **Std. Deviation** |
| Product Image, Ingredient Label | 6.06 | 2.13 |
| Product Image,  Product Label | 5.13 | 2.22 |
| Ingredient Image, Ingredient Label | 6.51 | 1.70 |
| Ingredient Image, Product Label | 6.07 | 2.02 |

**Supplemental Examination of Alternative Accounts**

The objective was to further test if (i) consumers are more skeptical of product- (vs. ingredient-) level organic labels or (ii) feel product- (vs. ingredient-) level organic labels are less informative.

* 50 AMT participants were asked to imagine that they had found several dish descriptions on the menus of various restaurants. Participants were then randomly assigned to either the product-level or ingredient-level condition and were shown, in random order, the descriptions of four dishes: burger, burrito, fajitas, and nachos. These four vice foods were chosen because they were used as stimuli in our studies.
* Participants in the product-level condition saw all four dishes described in the format “Organic X” (e.g., “Organic Burrito”). Participants in the ingredient-level condition saw all four dishes described in the format “X with all Organic Ingredients.” Beneath each dish description, participants were asked, “To what extent do you feel the above dish description is:”
  + truthful, honest, factual, accurate, informative—with all scales anchored at 1 (not at all) and 7 (completely).
* Finally, participants were asked, “True or False: The USDA has strict regulations regarding when a company may place an "organic" label on a food product.”

Results

* The five ratings were highly correlated for all the foods (minimum α = .962, for the burger) and, thus, were averaged into a single “accuracy score” for each food. The pattern of results is presented in table WA-7.1, with ANOVAs presented in table WA-7.2.

**Table WA-7.1: Accuracy Scores for Individual Products**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **label-level** | **ingredient (n = 26)** | | **product (n = 24)** | |
|  | *Mean* | *SD* | *Mean* | *SD* |
| **Burger** | 4.82 | 1.36 | 4.81 | 1.42 |
| **Burrito** | 4.74 | 1.53 | 4.52 | 1.67 |
| **Fajitas** | 4.66 | 1.54 | 4.42 | 1.61 |
| **Nachos** | 4.59 | 1.70 | 4.18 | 1.64 |

**Table WA-7.2: ANOVA Table (Accuracy Ratings)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Source** | **SS** | **df** | **MS** | **F** | **p** |
| burger | label | .003 | 1 | .003 | .001 | .970 |
| Error | 93.024 | 48 | 1.938 |  |  |
| Total | 93.027 | 49 |  |  |  |
| burrito | label | .614 | 1 | .614 | .241 | .626 |
| Error | 122.295 | 48 | 2.548 |  |  |
| Total | 122.909 | 49 |  |  |  |
| fajitas | label | .748 | 1 | .748 | .303 | .585 |
| Error | 118.695 | 48 | 2.473 |  |  |
| Total | 119.443 | 49 |  |  |  |
| nachos | label | 2.173 | 1 | 2.173 | .777 | .382 |
| Error | 134.223 | 48 | 2.796 |  |  |
| Total | 136.397 | 49 |  |  |  |

As can be seen, there was no significant differences in the composite accuracy score for any of the individual products. Thus, there is no evidence that consumers (i) are more skeptical of product- (vs. ingredient-) organic labels or (ii) think product-level organic labels are less informative or accurate. Additionally, 76% of participants correctly indicated that the statement, “The USDA has strict regulations regarding when a company may place an "organic" label on a food product,” was true. Thus, the majority of consumers recognize that organic labels are meaningful labels that cannot be arbitrarily applied to products by firms.