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Seeing the Light: Consumer Perceptions of Ground Beef Packages

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Abstract An experiment was designed to explore how evolving lighting light emitting diode (LED) technologies influence consumer hedonic motivations and behavioral intentions toward retail packages of ground beef. Warm LED bulbs influenced purchase intentions for ground beef more favorably than cool LED bulbs, or compact fluorescent cool white LED bulbs. In addition, participants rated post exposure hedonic impressions of the packaging more favorably for warm LED bulbs compared to cool LED bulbs, or compact fluorescent bulbs. Retailers may benefit from presenting meat under warm LED light sources to increase consumer attention to products and packaging.

Keywords Lighting, Packaging, Experiment, Design

1. Introduction

There is a critical need to understand the role of evolving lighting sources on food packaging and labeling with a specific emphasis on how consumer perceptions of packaging and products may change when they are viewed under different light sources. New technologies and types of light bulbs are evolving quickly in the consumer marketplace incorporating various light emitting diodes (LED) and compact fluorescent lighting (CFL) technologies. Understanding how consumers visually perceive the optical radiation from evolving light bulb technologies and how these light bulbs influence food package labels in interior environments will benefit industry and consumers alike. According to color theory, emotions can be influenced by certain colors, measured by wavelengths of visible light. Research has posited the emotional responses to color are stimulated by higher color saturation and lighter colors produce the opposite effect (Schauss, 1981). Brand icon shape manipulations and red or blue color packaging variations have been demonstrated to influence consumer perceptions about brand personality and purchase intentions (Labrecque & Milne, 2012). Packaging variations incorporating angular versus rounded shapes have suggested greater consumer-perceived approachability of food items versus perceived confrontation (Becker et al., 2011). The complex interplay of labeling, packaging, and the store environment (store display fixtures and lighting) is not clearly understood. New energy-efficient technologies such as LED light bulbs may help retailers influence consumer behavior through targeted modifications of food packaging, labeling, store fixturing and lighting designs to improve marketing of selected products while saving on their store's energy bills.

The appearance of packaged food is suspected to influence purchase intentions. Ground beef and its color and appearance within standard Styrofoam deli packaging have been demonstrated to be the greatest factor in purchase behaviors (Calkins, Goll, & Mandigo, 1986; Van Oeckel, Warnants, & Boucque, 1999). Until the consumer lends credence to their successful selection of ground beef by eating it, the appearance prior to purchase remains a critical factor which moderates purchase intentions (Risvik, 1994).The research team utilized an experimental approach to measure how different light bulbs influence consumers mood and behavioral (purchase intentions) towards ground beef. We want to demonstrate that variations in lighting offer the potential to increase the efficacy of certain retail food products.

2. Literature Review

Characteristics of light bulbs are described with various terminologies including: lumens, footcandles (lux), color rendering index (CRI), and Kelvin color temperature. Lumens are defined as the amount of light that the human eye is able to see. Footcandles or lux is the unit indicating the amount of illumination produced by a source of one candle at a distance of one foot. CRI describes the way objects appear under a given light source on a scale of 1 - 100. Low CRI light sources make objects illuminated by them appear

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unnatural and higher CRI light sources renders objects more naturally. Color temperature (Kelvin) is defined as the measured temperature at which a black body emits light at a specific spectral distribution. Low color temperature light sources appears warmer and with a range of more yellow to red light emitted while higher color temperature sources appear colder with bluer light emitted.

Grocery stores devote considerable sales floor square-footage to beef products. To encourage consumers to purchase meat products, several tactics are currently used: promotional pricing, eye-catching signs, novel packaging, exciting displays, and in some cases special lighting. A 2012 study of grocery shoppers stated that the meat they perceived as high quality was most important, followed by a broad assortment (Food Manufacturing Institute, 2012). On average, meat display cases occupy 82.2 meters in the U.S. and 4.5 meters for full service meat displays (Reicks et al., 2004). Methods for modifying lighting design, labels, packaging, store environments to work synergistically to best influence consumer attributions and purchase intentions is not clearly understood. Consumers have repeatedly expressed preferences for meat under incandescent bulbs compared to fluorescent and metal halide sources (Barbut, 2001; 2004). However, environmental concerns and economic efficiency are fueling the rapid growth and replacement of older incandescent technologies. By 2020, according to the Energy Independence and Security Act (United States Department of Energy, 2013), light bulbs are required to be 70% more efficient. The evolving technologies compact fluorescent and LED bulbs are more economical than incandescent bulbs when cost/lumen and lumens/watt are compared.

Lighting has been demonstrated to arouse or influence people to some degree based on its availability and levels (Gifford, 1988; Kurtich, 1993). In retail store environments, research has shown that brighter stores influence the inspection of goods, but not necessarily their purchase (Areni & Kim, 1994). Park & Farr (2007) suggest that cooler light sources produce greater interest in store signage, an important precursor to closer examination of products and packaging.

Perishable goods such as ground beef are routinely inspected and selected from store fixtures. Point of purchase selection estimates for ground beef packages is as high as 85% of all purchases (Medina & Ward, 1999). To encourage consumers to purchase meat products, several tactics are used: including promotional pricing, eye-catching signs, novel packaging, exciting displays, and sometimes special lighting. Light bulbs in grocery stores vary dramatically from store to store and lighting retrofits are substantial investments, particularly in economies of scale like retail grocery store chains. The consumerdecision criteria which influences favorable consumer affect towards food products or retail product categories offers potential for marketers and lighting designers to create optimal lighting configurations in stores.

Packaging for the purpose of our study is described as the material which remains in constant contact with the product until it is removed for consumption. The package serves many roles including: stabilizing, preserving, protecting, measuring, and identifying retail products to consumers. The current researchers propose that the packaging surrounding products influences attributions to the product within it and differs from Underwood et al. (2002) who suggest that packaging is mutually exclusive to the ingredients within. We believe that consumers may judge ground beef by the appearance of its packaging in the shopping environment, and posit strong interaction effects of stimuli in retail stores: lighting, store fixtures, packaging, price, and brand names that influence packaging and product perceptions. Ampuero and Vila (2006) found that high price/status orientation products require dark/cold packaging, utilitarian products require light/warm packaging and perceived safety was influenced by red packaging. Feelings about products and packaging have been demonstrated to influence purchase intentions (Sadeghi & Ghaemmaghami, 2011). Beverage packaging was tested and demonstrated that medium color temperatures most influenced emotions and purchase intentions in combinations with yellow/green and green "analogous" color combinations of light and packaging (Wang et al. 2009). Similar results were found by Briand and Pras (2013) in which warm color temperatures stimulated more positive reactions to retail environments and intention to buy compared to cooler color temperatures in simulated retail environments.

Consumer involvement and hedonic (emotional pleasure) with retail products has been studied extensively in the literature. Prior research has demonstrated that consumer decision making is guided by involvement and emotional satisfaction from buying various products. Utilitarian commodity products like ground beef are expected by consumers to be of expected quality, reasonably priced, in stock in stores and safe to buy and consume. Decision making criteria for staple food items such as ground beef are likely to be habitual or involve limited problem solving with low involvement most of the time. Limited problem solving may involve criteria like price/weight, promotions, shopper taste preferences, or their desires to try something new, etc. As Verbeke & Vackier (2004) found, involvement is moderated by concerns of food safety, and when consumers feel a product may pose health risks, their involvement in the purchase decision is likely to increase. Increasing a consumer's involvement in selecting higher-risk food products such as perishable ground beef may be accomplished to better packaging and lighting design in stores. Perceptions of food safety based on lighting variations requires further study, particularly with regard to evolving energy efficient bulbs such as LEDs and CFLs.

To accomplish this goal a pilot study was created to investigate the effects of three recently developed and commonly available retail light bulbs on consumer attitudes towards packaging and their purchase intentions for ground beef. Cooler light sources are anticipated to influence lower visual acuity than warm sources because of lower hue

processing at the lower (blue) end of the spectrum (Knez & Kers, 2000; Blackwell & Blackwell, 1980; Nuckolls, 1983).

2.1. Hypotheses

Prior research has demonstrated the influence of product pictures on packaging to influence involvement with the brand. A consumer presumably makes better purchase decisions when they have a strong mental picture of what qualities they seek in a product (Underwood et al, 2002). Traditional deli-packaging allows for close examination of the meat the consumer is considering buying. The packaging and product under consideration must also align with a consumer's mental images of what is a suitable product compared to alternatives. Creusen and Schoormans (1998) explored mental models of utilitarian produces like ground beef and found consumers general impressions influence involvement when a consumer is browsing products quickly in stores.

Underwood et al. (2002) demonstrated that package design can alter a consumer's attitude toward the package. We wish to better understood the influence of controlling for novel differences between product packages that a consumer may choose such as national/store brands and testing the same product and same packaging to learn if different light sources influence the consumer's attitude toward the packaging. As Maheswaran and Meyers-Levy (1990) in their ground beef study higher reported involvement influenced greater analysis of product information. Low involvement subjects relied solely on general impressions or heuristics to influence their attitudes about the packages of ground beef.

H1a: Pre-exposure appearance will influence post-exposure appearance.

H1b: Pre-exposure appearance will influence pre-exposure involvement.

H1c: Pre-exposure involvement will influence post-exposure attitude toward the packaging.

The role light bulbs play ininfluencinga consumer's hedonic adaptations is not clearly understood. Our eye can transmit up to three million bits of information per second and light radiation variations may induce adaptation to perception including a sense of pleasure (Frederick & Loewenstein, 1999) related to products consumers observe in stores. How light sources create different feelings of pleasure among consumers which are attributable to products requires substantial research. A consumer's emotional senses of pleasure or emotional gratification prior to selecting products they ultimately plan to purchase are suspected to be linked.

H2a: Pre-exposure hedonic perceptions of the package will influence post-exposure hedonic perceptions.

H2b: Post-exposure hedonic perceptions of the package will influence purchase intentions.

Ampuero & Vila (2006) found that utilitarian goods such as ground beef packages were perceived more favorably in warm and light color configurations (primarily white). Variations to the color temperatures of light sources impacting packaging perceptions from color rendering effects are suspected to influence various factors which influence packaging perceptions. Recent research by Banissy et al. (2013) suggests that colder light sources based on blue LED light may contribute to eye strain because the light passing through people's retinas is refracted and creates additional difficulty for consumers to focus on packaging details such as printed text. This problem is likely compounded in older consumers whose cornea naturally yellows with age and who are likely to experience different perceptions of packaging under blue light sources (DiLaura et al., 2011).

H3-H7: The light source that subjects are exposed to influences perceptions of: post exposure appearance of the packaging, post exposure perceived food safety, post exposure attitude toward the packaging, post exposure hedonic and purchase intentions.

Consumers attribute the food safety of products such as ground beef based on the packaging Patil et al., 2005). Perceptions of food safety based on homogenous ground beef packages presented under different incidental light sources are not known. We suspect that if a consumer forms inferences of problems with the packaging or unusual coloration of the ground beef that these factors may influence perceived safety of the packaging. General impressions of food safety of the ground beef a participant observes will moderate their attitudes toward the packaging. These effects may vary under different light sources where different levels of color rendering may alter the subject's perception of the product's appearance.

H8-H9: Perceived safety of the package will influence post-exposure attitude toward the package and purchase intentions.

Consumer attitudes toward packaging have been linked to purchase intentions in prior research (Schwepker & Cornwell, 1991; Follows & Jobber, 2000). We wish to better understand the roll of different light bulbs on packaging attitudes and ultimately how these attitudes influence purchase intentions.

H10: Post-exposure attitude toward the packaging will influence purchase intentions.

3. Methods

3.1. Samples

A total of 276 subjects were recruited by a large public Southern university to participate in the study. The characteristics of the sample may be found in Appendix 4. Subjects were pre-screened to determine if they had purchased ground beef during the prior six month period.

3.2. Data Collection and Analysis

The survey instrument contained 19 items plus demographic variables adapted from Bloch, Brunel, & Arnold (2003) centrality of visual product aesthetics; Mattila,

& Wirtz (2001) semantic differential scale; Mehrabian & Russell's (1974) arousal and pleasure scales; and Dodds, Monroe & Grewal (1991) willingness to buy scale (Appendix 5). Subjects arrived at the experiment; completed informed consent documents, a pre-test survey to assess their opinions about ground beef and ground beef packaging and a post-test after exposure to one lighting condition. Three lighting condition were set up for this study (Condition A Light Bulb: Warm White light LED, Condition B Light Bulb: Cool White LE, and Condition C Light bulb: Soft White CFL. The light bulb attributes in each of the three lighting conditions tested may be found in appendix 1. Three packages of 90% lean/10% fat, Black Angus ground beef were purchased from a local regional grocery store chain for the study (Appendix 2.) Hourly temperature and lumen (FC) readings were completed and may be found in Appendix 3.As Gill and Jones (1994) discovered in their study, deli packages are sensitive to time and temperature effects on beef appearance. The background colors were black to increase the participant focus on the display setting and packaging and minimize potential color differences in the test environment. Two light bulbs were placed in gooseneck adjustable black lamps holders and placed above the meat. The lights were positioned with the goal of maintaining 100 Foot Candles (FC) based on a survey of three local grocery stores and a restaurant selling beef in a display case from which customers select their choices. During the experiment data collection, light intensities varied from 87.4-103.8 FC with a mean of 98.0 FC and SD=3.792 FC.

4. Results

4.1. Exploratory and Confirmatory Factor Analysis

The preliminary measurement model for this pilot study was assessed using exploratory factor analysis. The fit indices for the EFA were, X^2 = 2382 (1182 DF), p<.001, CFLI = .896 SRMR = .137 RMSEA = .035. Four items with unfavorable loadings; pre-hedonic 1, loading .59, post-hedonic 1, loading .49, and two items from post exposure attitude toward the package, pessimistic, loading .42 and bored, loading .55 were eliminated from the measurement model prior to completing a confirmatory factor analysis (CFA) as shown in Appendix 5.

The measurement model was assessed for internal consistency using Cronbach's alpha. The alphas for the CFA are presented in Appendix 6. Convergent validity was measured by using the standard suggested by Fornell & Larcker (1981), loadings over .50 and the AVE explained was greater than the average variance unexplained or indicated within measurement error. Composite reliabilities utilizing Cronbach's alpha ranged from .78 to .91.

The factor structure of the 15 item post-EFA scale was examined. All of the items correlated >.30, indicating factorability. Next, the Kaiser-Meyer-Olkin measure of sampling adequacy was .873, above the recommended value of .6. Bartlett's test of sphericity was significant. The communalities were all above .75, indicating that each item shared common variance with other items. The anti-image correlation matrix diagonals were all above .5.

4.2. Path Analysis and Modeling Testing

We examined the structural model using a hybrid structural equation model in AMOS (i.e. measurement and structural model combined) to analyze the proposed model. All hypothesized independent variables were allowed to co-vary freely for this analysis. The fit indices for the multi-group hybrid SEM model are: X^2 = 1220 (726 DF), p<.001, CFI = .946 SRMR = .07 RMSEA = .029. Diagrams of the path models for each lighting condition may be found in Appendix 7.

4.3. Hypothesis Testing

Hypotheses 1a and 1b were not supported. The pre-exposure reports of the importance of ground beef appearance did not influence the participant involvement with ground beef purchases or post exposure appearance of the package. Hypothesis 1csuggested a relationship between pre-exposure reported involvement in ground beef purchases would influence post exposure attitudes to the package and was supported only for Condition A, Warm White LED B = -.147(.042), p<.05. Bulbs B and C did not have a significant impact on post exposure attitudes toward the packaging. The inverse relationship for condition A suggests that heuristic cues about ground beef may be greater than actually viewing a typical package of ground beef during an experiment. Hypothesis 2a posited a relationship between pre-exposure reports of hedonic benefits of purchasing ground beef on post exposure reports of hedonic benefits of purchasing ground beef. In all conditions, A-C, hedonic/pleasure perceptions reported by participants pre-exposure demonstrated a positive significant influence on post-exposure hedonic perceptions, Condition A, *B=.415(.118) p<.001,* Condition B, *B=.476(.120) p<.001,* Condition c, *B=.555(.115) p<.001.* Hypothesis 2bsuggested a relationship between post-exposure reported hedonic feelings about the ground beef and reported purchase intentions and was supported for all three lighting conditions tested: Condition A,*B* = .168(.084) p<.05, Condition B, *B*=.270(.137) p<.05, Condition C, *B*=.395(.122) p<.01. Hypotheses 3-7 posited a relationship between each tested light source perceived brightness and appearance, perceived safety, purchase intentions, attitudes toward the package, and hedonic emotions. Hypotheses 3-6. Hypothesis 3—brightness on appearance was not significant for Condition A, but was for Conditions B and C. Hypotheses 4 and 5—hedonic and attitude toward the package was not significant for Condition B, was for Conditions A and C. Hypotheses 6—perceived safety was significant for all three lighting conditions. Hypothesis 7—purchase intentions were not significant in any of the three lighting conditions. Hypothesis eight suggested a relationship between perceived

safety and post exposure attitude toward the packaging and was supported in all three conditions: Condition A, *B*=.309(.063) p<.001, Condition B, *B*=.391(.066) p<.001, Condition C, *B*=.469(.075) p<.001. Hypothesis 9 posited a relationship between perceived safety and purchase intentions and was not supported in any of the three lighting conditions. Hypothesis 10 suggested a relationship between post exposure attitude toward the package and purchase intentions and was supported in all three lighting conditions: Condition A, *B*=.870(.187) p<.001, Condition B, *B*=.774(.221) p<.001, Condition C, *B*=.453(.179) p<.05.

5. Discussion and Implications

Subjects reported greater post exposure packaging appearance perceptions for the Warm LED light bulb compared to the Cool LED bulb of Soft White CFL bulbs tested when comparing reported pre-exposure importance of packaging appearance. Subjects reported significantly greater attitudes toward the packaging for Warm White LED light bulbs than for Cool White LED light bulbs or CFL Soft White bulbs tested. The evidence suggests that there are no significant differences between the Cool White LED bulb and the Soft White CFL bulb on packaging perceptions. This may be related to the common use of Cool White and Soft White bulbs in grocery store environments today. In each experimental condition A-C, there is no evidence to suggest that there are significant differences between tested light bulbs on purchase intentions.

This study explored the influence of consumer perceptions of product packaging and hedonic beliefs about ground beef as indicators of their involvement toward a package of ground beef. In an experiment, hedonic ground beef associations and importance of product packaging were assessed in a pretest. After subjects completed the pre-test we assessed the potential moderating effects of different light sources on hedonic and appearance perceptions, involvement, attitudes towards packaging and purchase intentions. When ground beef was presented under compact fluorescent soft white bulbs, CRI 82, 2700K purchase intentions were not significantly different than those for LED light sources. Barbut (2001) tested Cool and Warm White Fluorescent bulbs and found that Cool White Bulbs were more appealing for meat packages. For the LED bulbs we tested, we found the opposite with Warm White bulbs influencing more favorable beef packaging perceptions than Cool White LED light bulbs. However, consistent with Barbut, participants post exposure hedonic perceptions significantly influence purchase intentions suggesting that consumers purchase ground beef in various lighting conditions at different retail stores. This finding also supports Risvik (1994) that a product's color, appearance, and texture most influence purchase preferences when subjects are unable to sample products prior to consumption.

Appendix 1. Consumer Light Bulb Comparisons for Experimental Conditions

DESCRIPTION		*Retail Price*	*Hours*	*Lumens*	Wattage	*Lumens/Watt*	*Cost/Lumen*
#212P46 Accuity Brands (A19) 50K Hours, 620 Lumens, 11 W, LED, CRI 80, Warm White 2800K	CONDITION A	$ 42.53	50000	620	11	56	$ 0.03
#6GEM3 Westinghouse Luma Pro (A19), 50K Hours 490 Lumens, 8 W, LED, CRI 85, Cool White 5000K	CONDITION B	$ 38.34	50000	490	8	61	$ 0.08
#74436 GE Energy Smart (A19), 8K Hours, 450 Lumens, 9W, Compact Fluorescent, CRI 82, Soft White 2700K	CONDITION C	$ 15.60	8000	450	9	50	$ 0.09

Appendix 2. Foot Candle and Temperature Readings during Data Collection

2/28/2013	8:00	9:00	10:00	11:00	12:00	1:00P	2:00	3:00	4:00	5:00	Mean	SD
Ground Beef Temperature (F)	50	48	40	40	40	44	42	42	42	42	43.0	3.26
Meter Reading (FC)	101.3	102.4	104.6	102.1	108.5	105.5	103.9	102.3	104.4	102.7	103.8	2.01
Ground Beef Temperature (F)	52	50	42	42	43	44	44	50	52	54	47.3	4.47
Meter Reading (FC)	99.5	101.8	100.8	101.3	96	106.1	101.9	103.9	97.1	100.1	100.9	2.81
Ground Beef Temperature (F)	50	40	42	42	42	44	44	46	48	48	44.6	3.10
Meter Reading (FC)	98.9	99.9	98.5	101.7	97.3	98.2	101.8	96	100.6	99.7	99.3	1.76

3/2/2013	8:00	9:00	10:00	11:00	12:00	1:00 PM	2:00	3:00	4:00	5:00	Mean	SD
Ground Beef Temperature (F)				40	40	38	38	42	42		40.0	1.63
Meter Reading (FC)				102.9	102.3	100.5	102.9	99.7	98		101.1	1.82
Ground Beef Temperature (F)				32	32	32	32	36	40		34.0	3.06
Meter Reading (FC)				100.1	101.4	98.6	103.7	102.9	101.6		101.4	1.69
Ground Beef Temperature (F)				28	32	32	32	42	40		34.3	4.96
Meter Reading (FC)				99.1	96	100.8	97.7	96.8	98.4		98.1	1.56

6/5/2013	8:00	9:00	10:00	11:00	12:00	1:00 PM	2:00	3:00	4:00	5:00	Mean	SD
Ground Beef Temperature (F)						34	36	36			35.3	.943
Meter Reading (FC)						101.8	96.4	96.1			98.1	2.62
Ground Beef Temperature (F)						38	40	40			39.33	0.943
Meter Reading (FC)						101.4	100.7	88			96.7	6.16
Ground Beef Temperature (F)						36	40	42			39.33	2.49
Meter Reading (FC)						96.1	88	87.4			90.5	3.97

MEAN	SD
98.9	3.79

Appendix 3. Photographs of Experiment

LED (Warm Color) Treatment A

LED (Cool Color) Treatment B

LED (Cool White Color) Treatment C(ontrol)

Appendix 4. Demographics of the sample

	Male	%	Female	%
Gender	44	16	231	84

Age	80+	22	8%
	71-80	12	4%
	61-70	2	1%
	51-60	0	0%
	41-50	2	1%
	31-40	7	3%
	18-30	230	83%

Education	Less than high school	1	0.4%
	high school	30	11%
	Some college	166	60%
	2 year degree	21	8%
	4 year degree	38	14%
	Master	15	5%
	Doctoral	2	1%

Race	White	222	80%
	African American	9	2%
	Hispanic	5	2%
	Asian	22	8%
	Native American	12	4%
	Pacific Islander	1	0%
	Other	1	0%

Appendix 5. Exploratory Factor Analysis Loadings, Average Variance Extracted and Scale Reliability

Item Description

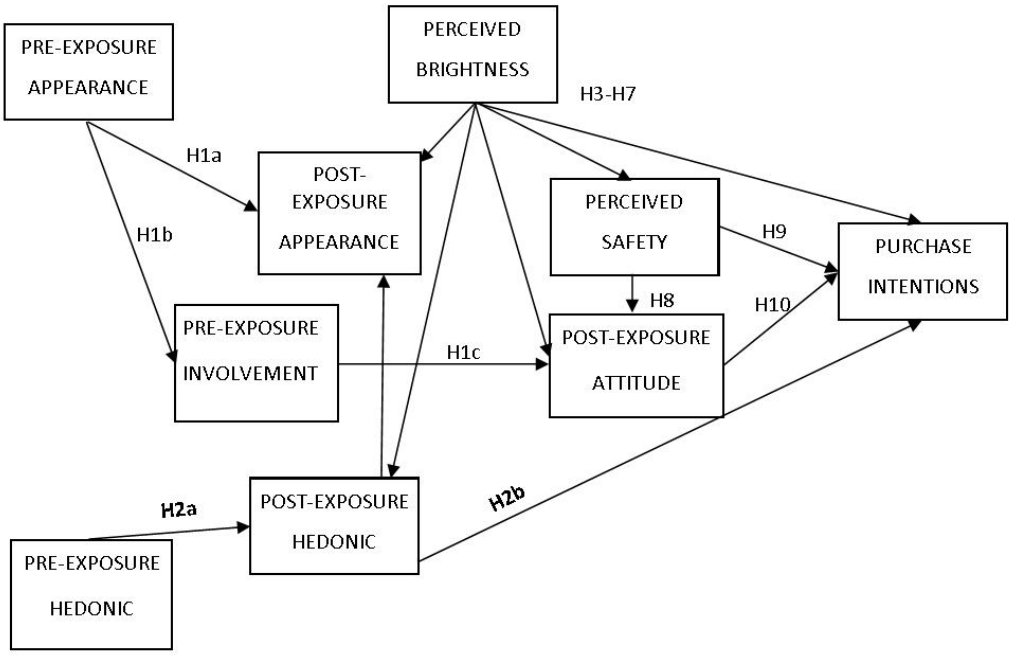
	Loading	AVE	Cronbach's Alpha
Pre-Exposure Hedonic			0.807
It gives me pleasure to purchase ground beef	1	0.595	
Buying ground beef is like buying a treat for myself	.926(.068)	0.874	
Ground Beef is somewhat of a pleasure to eat	.869(.074)	0.797	
Pre-Exposure Involvement			0.782
I attach great importance to ground beef purchases (Strongly Disagree to Strongly Agree)	1	0.612	
One can say ground beef interests me a lot (Strongly Disagree to Strongly Agree)	.932(.062)	0.665	
Post-Exposure Appearance			0.82
Please rate the product attributes of this package of ground beef (Extremely Unattractive to Extremely Attractive	1	0.635	
(Extremely Bad to Extremely Good)	1.068 (.07)	0.744	
Post-Exposure Hedonic			0.896
I feel good when I observe the ground beef (Strongly Disagree to Strongly Agree)	1	0.595	
The ground beef I observed makes me happy (Strongly Disagree to Strongly Agree)	1.205 (.072)	0.874	
The ground beef I observed gives me pleasure (Strongly Disagree to Strongly Agree)	1.127 (.07)	0.797	
Post-Exposure Attitude Toward Package			0.896
How would you describe your attitude toward this package of ground beef ?			
Extremely Harmful to Extremely Beneficial	1	0.717	
Extremely Bad to Extremely Good	.932(.062)	0.597	
Extremely Useless to Extremely Useful	.894(.057)	0.625	
Extremely Foolish to Extremely Wise	.888(.056)	0.642	
Extremely Pessimistic to Extremely Optimistic	.781(.067)	0.418	
Extremely Bored to Extremely Engaged	.714(.047)	0.548	
Purchase Intentions			0.913
The likelihood I would buy this ground beef is high (Strongly Disagree to Strongly Agree)	1	0.755	
I would be willing to buy this ground beef (Strongly Disagree to Strongly Agree)	.99(.046)	0.861	
I would be willing to recommend buying this ground beef to my friends (Strongly Disagree to Strongly Agree)	.93(.048)	0.765	

Chi-square = 2382 (1182 df), p<.001, CFLI = .896 SRMR = .137 RMSEA = .035

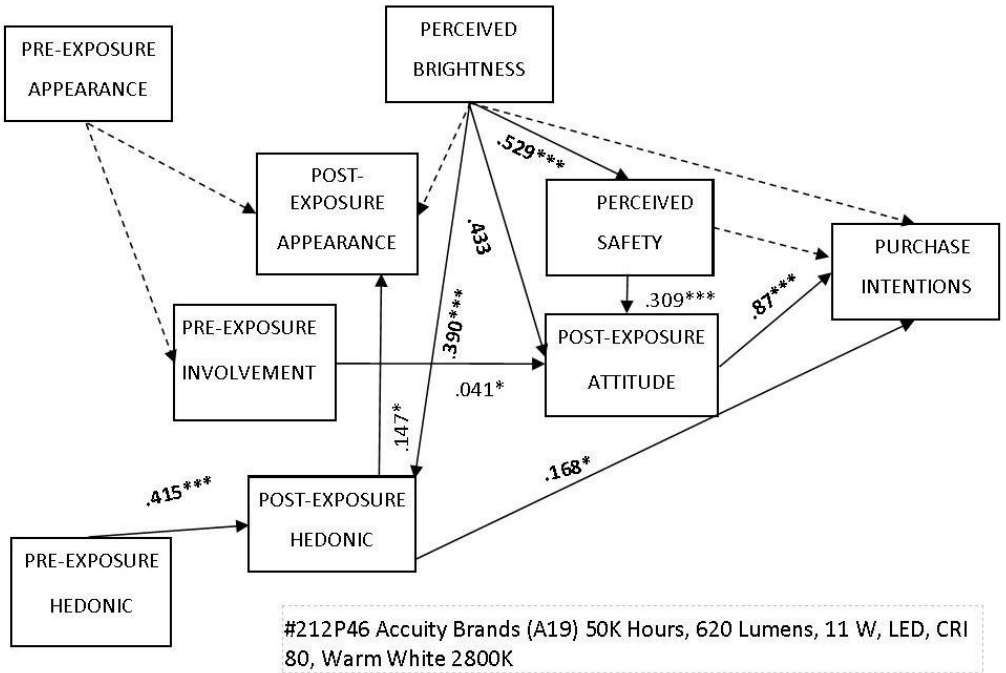
Appendix 6. Confirmatory Factor Analysis Loadings, Average Variance Extracted and Scale Reliability

Item Description	Loading	AVE	Cronbach's Alpha
Pre-Exposure Hedonic			
It gives me pleasure to purchase ground beef	1	0.701	0.781
Buying ground beef is like buying a treat for myself	0.911 (.07)	0.593	
Pre-Exposure Involvement			
I attach great importance to ground beef purchases (Strongly Disagree to Strongly Agree)	1	0.668	0.781
One can say ground beef interests me a lot (Strongly Disagree to Strongly Agree)	.929(.069)***	0.609	
Post-Exposure Appearance			
Please rate the product attributes of this package of ground beef (Extremely Unattractive to Extremely Attractive	1	0.639	0.82
(Extremely Bad to Extremely Good)	1.06(070)***	0.739	
Post-Exposure Hedonic			
The ground beef I observed makes me happy (Strongly Disagree to Strongly Agree)	1	0.782	0.896
The ground beef I observed gives me pleasure (Strongly Disagree to Strongly Agree)	1.05(.058)***	0.903	
Post-Exposure Attitude Toward Package			
How would you describe your attitude toward this package of ground beef ?			0.877
Extremely Harmful to Extremely Beneficial	1	0.748	
Extremely Bad to Extremely Good	.927(.060)***	0.617	
Extremely Useless to Extremely Useful	.868(.056)***	0.615	
Extremely Foolish to Extremely Wise	.844(.055)***	0.604	
Purchase Intentions			
The likelihood I would buy this ground beef is high (Strongly Disagree to Strongly Agree)	1	0.756	0.913
I would be willing to buy this ground beef (Strongly Disagree to Strongly Agree)	.989(.046)***	0.86	
I would be willing to recommend buying this ground beef to my friends (Strongly Disagree to Strongly Agree)	.933(.048)***	0.765	

Appendix 7. Conceptual Model and Multi-group Hybrid Structural Equation Model Path Diagrams

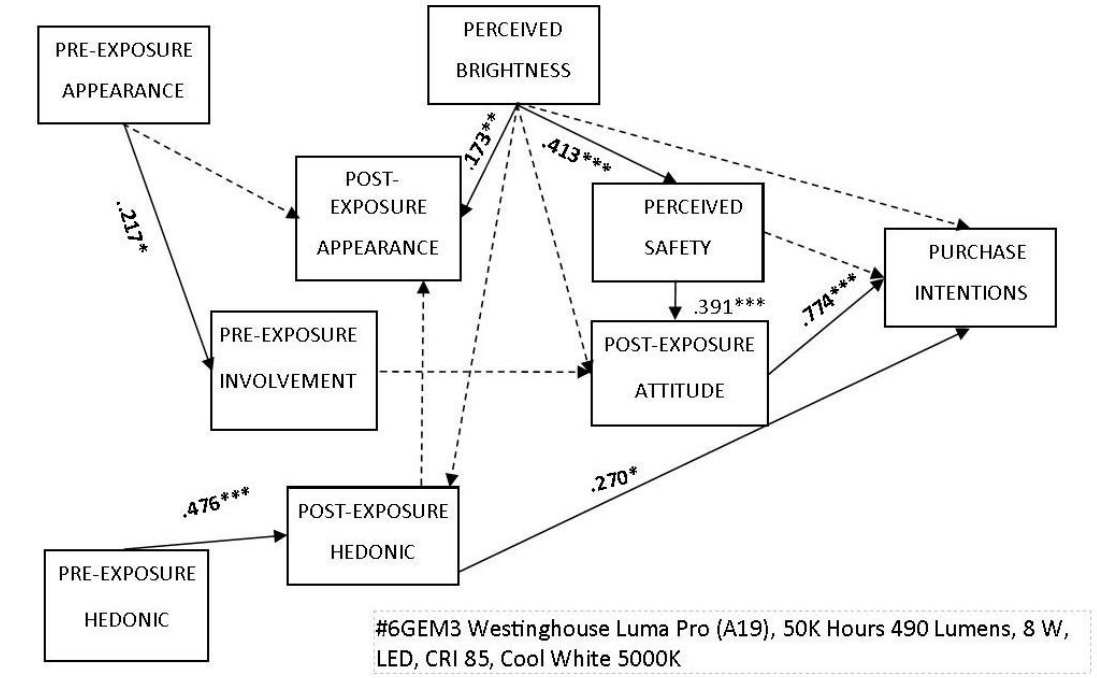


Condition A

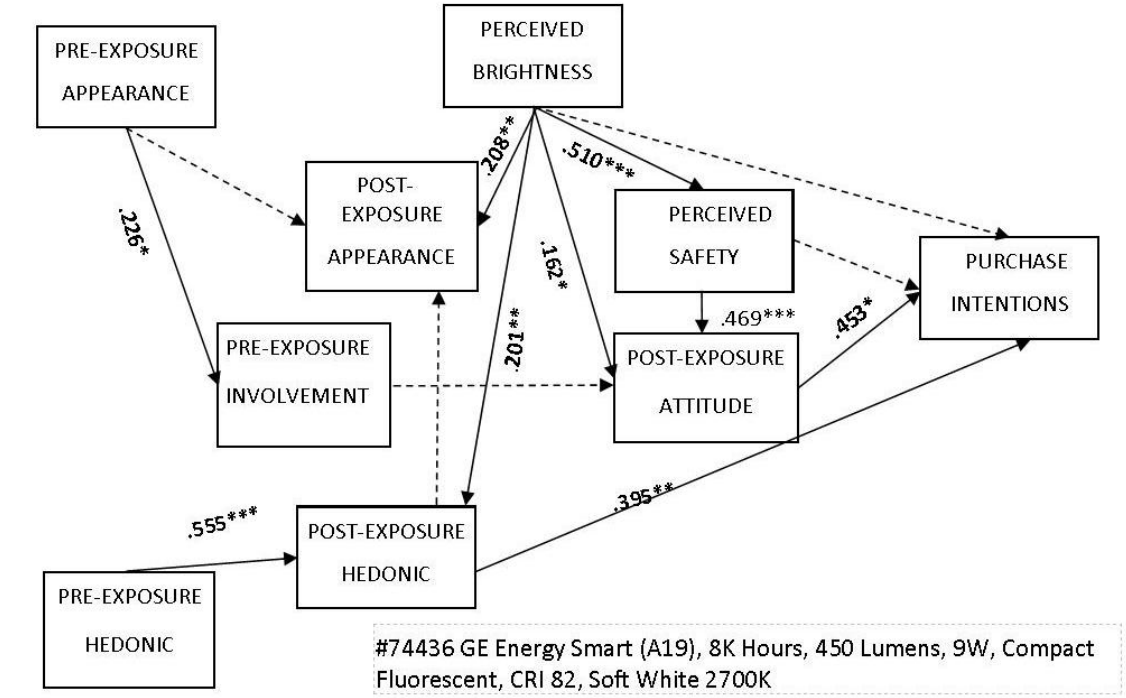


Appendix 7 (cont'd.) Multi-group Hybrid Structural Equation Model Path Diagrams

Condition B



Condition C



REFERENCES

[1] Ampuero, O., & Vila, N. (2006). Consumer perceptions of product packaging. *Journal of Consumer Marketing*, *23*(2), 100-112.

[2] Areni, C. S., & Kim, D. (1994). The influence of in-store lighting on consumers' examination of merchandise in a wine store. *International Journal of Research in Marketing*, *11*(2), 117-125.

[3] Banissy, M. J., Tester, V., Muggleton, N. G., Janik, A. B., Davenport, A., Franklin, A., ... & Ward, J. (2013). Synesthesia for color is linked to improved color perception but reduced motion perception. *Psychological science*, *24*(12), 2390-2397.

[4] Barbut, S. (2001). Effect of illumination source on the appearance of fresh meat cuts. *Meat science*, *59*(2), 187-191.

[5] Barbut, S. (2005). Effect of enhanced fluorescent light on acceptability of meat cuts. *Journal of Muscle Foods*, *16*(2), 77-86.

[6] Becker, L., van Rompay, T. J., Schifferstein, H. N., & Galetzka, M. (2011). Tough package, strong taste: The influence of packaging design on taste impressions and product evaluations. *Food Quality and Preference*, *22*(1), 17-23.

[7] Blackwell, H.R. & Blackwell, O.M. (1980). Population data for 140 normal 20-50 year olds for use in assessing some effects of lighting upon visual performance, *International Commission on Illumination* 19(2).

[8] Bloch, P. H., Brunel, F. F., & Arnold, T. J. (2003). Individual differences in the centrality of visual product aesthetics: concept and measurement. *Journal of consumer research*, *29*(4), 551-565.

[9] Calkins, C. R., Goll, S. J., & Mandigo, R. W. (1986). Retail display lighting type and fresh pork color. *Journal of Food Science*, *51*(5), 1141-1143.

[10] Creusen, M. E., & Schoormans, J. P. (1998). The influence of observation time on the role of the product design in consumer preference. *Advances in consumer research*, *25*(1).

[11] Briand D. G., & Pras, B. (2013). Simulating in-store lighting and temperature with visual aids: methodological propositions and S–O–R effects. *The International Review of Retail, Distribution and Consumer Research*, *23*(4), 363-393.

[12] DiLaura, D. L., Harrold, R. M., Houser, K. W., Mistrick, R. G., & Steffy, G. R. (2011). A procedure for determining target illuminances. *Leukos*, *7*(3), 145-158.

[13] Dodds, W. B., Monroe, K. B., & Grewal, D. (1991). Effects of price, brand, and store information on buyers' product evaluations. *Journal of marketing research*, 307-319.

[14] Food Manufacturing Institute, (2012). U.S. grocery shopper trends, retrieved from: http://www.icn-net.com/docs/12086_FMIN_Trends2012_v5.pdf.

[15] Follows, S. B., & Jobber, D. (2000). Environmentally responsible purchase behaviour: a test of a consumer model. *European Journal of Marketing*, *34*(5/6), 723-746.

[16] Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of marketing research*, 39-50.

[17] Frederick, S., & Loewenstein, G. (1999). Hedonic adaptation.

[18] Gifford, R. (1988). Light, decor, arousal, comfort and communication. *Journal of Environmental Psychology*, *8*(3), 177-189.

[19] Gill, C. O., & Jones, T. (1994). The display of retail packs of ground beef after their storage in master packages under various atmospheres. *Meat science*, *37*(2), 281-295.

[20] Knez, I., & Kers, C. (2000). Effects of indoor lighting, gender, and age on mood and cognitive performance. *Environment and Behavior*, *32*(6), 817-831.

[21] Kurtich, J. (1993). Interior architecture.

[22] Labrecque, L. I., & Milne, G. R. (2012). Exciting red and competent blue: the importance of color in marketing. *Journal of the Academy of Marketing Science*, *40*(5), 711-727.

[23] Maheswaran, D., & Meyers-Levy, J. (1990). The influence of message framing and issue involvement. *Journal of Marketing research*, 361-367.

[24] Mattila, A. S., & Wirtz, J. (2001). Congruency of scent and music as a driver of in-store evaluations and behavior. *Journal of Retailing*, *77*(2), 273-289.

[25] Medina, S., & Ward, R. W. (1999). A model of retail outlet selection for beef. *The International Food and Agribusiness Management Review*, *2*(2), 195-219.

[26] Mehrabian, A., & Russell, J. A. (1974). *An approach to environmental psychology*. the MIT Press.

[27] Nuckolls, J.L. (1983). Interior lighting for environmental designers, Wiley, New York, NY

[28] Park, N. K., & Farr, C. A. (2007). Retail store lighting for elderly consumers: an experimental approach. *Family and Consumer Sciences Research Journal*, *35*(4), 316-337.

[29] Patil, S. R., Cates, S., & Morales, R. (2005). Consumer food safety knowledge, practices, and demographic differences: findings from a meta-analysis. *Journal of Food Protection®*, *68*(9), 1884-1894.

[30] Reicks, A. L., Brooks, J. C., Kelly, J. M., Kuecker, W. G., Boillot, K., Irion, R., & Miller, M. F. (2008). National Meat Case Study 2004: Product labeling information, branding, and packaging trends. *Journal of animal science*, *86*(12), 3593-3599.

[31] Risvik, E. (1994). Sensory properties and preferences. *Meat Science*, *36*(1), 67-77.

[32] Sadeghi, T., & Ghaemmaghami, K. T. (2011). The Correlation Between Feelings and Brand Perception on Purchase Intention. *World Applied Sciences Journal*, *12*(5), 697-705.

[33] Schauss, A. G. (1981). Application of behavioral photobiology to human aggression: Baker-Miller pink. *The International Journal for Biosocial Research*,*2*, 25-27.

[34] Schwepker Jr, C. H., & Cornwell, T. B. (1991). An examination of ecologically concerned consumers and their

intention to purchase ecologically packaged products. *Journal of Public Policy & Marketing*, 77-101.

[35] United States Department of Energy (2013). Energy Independence and Security Act of 2007, retrieved from: http://www.afdc.energy.gov/laws/eisa.

[36] Underwood, R. L., & Klein, N. M. (2002). Packaging as brand communication: effects of product pictures on consumer responses to the package and brand. *Journal of Marketing theory and Practice*, 58-68.

[37] Van Oeckel, M. J., Warnants, N., & Boucqué, C. V. (1999). Measurement and prediction of pork colour. *Meat Science*, *52*(4), 347-354.

[38] Verbeke, W., & Vackier, I. (2004). Profile and effects of consumer involvement in fresh meat. *Meat Science*, *67*(1), 159-168.

[39] Wang, R. W., Chen, Y. C., & Huang, C. T. (2009).Research into the emotion dimensions revealed by the colors of beverage packaging, retrieved from: http://pc01.lib.ntust.edu.tw/ETD-db/ETD-search/view_etd?URN=etd-0715110-151313.