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경제학 석사 학위논문

**The Effect of Color on
Beverage Product Evaluation**

색깔이 음료 제품 평가에 미치는 영향

2015년 2월

서울대학교 대학원

농경제사회학부 지역정보전공

조 종 표

The Effect of Color on Beverage Product Evaluation

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Abstract

The Effect of Color on Beverage Product Evaluation

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A consumer's food choices are related to many factors. Among these, the color of food is one primary way in which a product inspires an expectation of its flavor, while also helping the consumer notice the product. Edible pigment is widely used for coloring food. Yet this basic type of food additive has been the topic of debate among experts and consumers. This study examines the effect of beverage color and bottle color on consumer responses like satisfaction and willingness to buy. To achieve this study's stated aims, this study first created a strawberry-flavored beverage and conducted drinking experiments with 300 participants, testing their reactions to the color of the beverage's bottle and of the beverage itself. The results show that when the transparent beverage was offered in a red bottle satisfaction and willingness to buy were greater than they were when the beverage and its bottle were other colors. Additionally, moderating variables had significant effects under different conditions.

Keywords: Expectancy Disconfirmation Theory, Assimilation-Contrast Effect, Expectation, Beverage color, Food additives, Satisfaction

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I. Introduction

1. Background

Various factors influence consumer food choice (Wansink, 2004). Food-related consumer behaviors are affected not only by sensations like taste, smell, and texture but also by a combination of psychosocial influences, bodily states, and expectations (Cardello, 1994; Stroebele & De Castro, 2004). These factors have been investigated in many ways, and the visual factor in particular has one of the greatest influences on consumer food choice (Spence et al., 2010). Since the visual factor is important, producers go to great lengths to make food visually appealing. In fact, food color is one of the ways products approach consumers and consumers recognize products (Clydesdale, 1993; Walsh et al., 1990; Stillman, 1993). In short, food color inspires expectations and helps consumers identify products (Cardello, 1994; Garber et al., 2000).

Natural and artificial edible pigments are widely used to color foods. These kinds of pigments are classified as food additives (Kim, 2013). Some experts and food scientists believe that legally allowed food additives are harmless to human body, but the media and some consumers insist that safe food additives are rare. Health concerns are ever more pronounced, and food-safety issues are becoming very high-profile. Food additives, artificial coloring, and preservatives cause concern for consumers (Jin & Kim, 2009; Baek & Lee, 2006), albeit regulations for food additives exist in many countries, and a joint effort has been undertaken to institute consistent food

standards (Depew, 1963; Codex Alimentarius Commission, 2013). In fact, foods and beverages containing disallowed food additives are impossible to make and sell through normal channels.

Meanwhile, most academic efforts related to food additives have focused on investigating which food additives are harmful to people, how food additives affect the human body, and whether food regulations and policies are valid. The Codex Alimentarius Commission (CAC) and EU Parliament continuously try to impose consistent food-additive regulations (Kim, 2013; EU Regulation, 2008). Consequently, research into consumer responses and behaviors toward food additives is insufficient. The preferences of the general consumer are hard to discern in detail about food additives, and thus, external factors like color and flavor are utilized to identify them (Jin & Kim, 2009). Suffice it to say, more research into the effects of color and food additives on consumer perceptions and responses is necessary.

The main goal of this study is to investigate the influence of edible pigment on consumer behavior. As such, this study attempts to examine (1) expectation's effects, in terms of color incongruity, on product evaluation, (2) the influence of product characteristics, and (3) how health perceptions and attitudes toward food additives are influencing consumer responses.

Specifically, this study examines how drinking beverages of various colors and tastes effects perceptions of food additives. By investigating the

influence of edible pigment and the incongruity between color and flavor on consumer responses like satisfaction and willingness to buy, this study hopes to explain consumers' attitudes toward food additives and to develop strategies for improving consumer satisfaction. In order to achieve this goal, the present study created a beverage, varied the color of its contents and bottle, and conducted drinking experiments in which sample consumers evaluated the beverage.

2. Research Questions

As mentioned above, this study aims to identify consumer responses to edible pigments and colors. This study assumes an incongruity between concepts of color and flavor and expectations about a beverage; as such, it hypothesizes that incongruent color can be a tool for determining the effects of edible pigments on consumer responses. To achieve this goal, the present study poses the following research question:

RQ1: What features elicit positive and negative expectations and responses to the beverage from average consumers?

After determining the general consumer response to the beverage, this study then attempts to determine which other factors moderate the effects of color and edible pigmentation. Product characteristics and health-related factors, such as attitudes toward food additives and perceived health

status, are also investigated. To achieve this goal, the present study poses the following additional research questions:

RQ2: Based on the type of beverage, which factors influence the willingness and level of satisfaction consumers feel when deciding whether to buy a beverage?

II. Literature Review

1. Antecedent Factors for Food-related Consumer Behavior

Factors like personal preference, sound, temperature, aroma, color, and time complexly affect food choice (Stroebele & De Castro, 2004). Diverse studies have examined the influence environmental factors have on consumer behavior. Wansink (2004) focuses on consumption volume and investigates psychological mechanisms that influence consumer behavior. Environmental factors like atmosphere, social context, distractions, food salience, and package or container size can complexly act together to make consumers eat more or less. In terms of packaging-related factors, package design can help regulate food intake and, thus, increase or decrease consumption levels (Argo & White, 2012). Indeed, even background music can influence food-related consumer behavior; Caldwell & Hibbert (2002) and Milliman (1986) have investigated the influence of background music on consumer preferences and consumption behavior: Music tempo and preference influence actual and perceived time spent dining and the amount of money spent dining.

Cardello (1994) suggests a schematic model of food-related behaviors, explaining the process from receiving food to making food-related decision. Food can be viewed as a sensory stimulus like taste, smell, texture, appearance, and temperature. After accounting for various influences, such as culture, psychosocial status, bodily state, expectation, and mental experience with sensory attributes, consumers make emotional

responses and accept or reject a product. Actual consumer behaviors like consumption, choice, and making a purchase subsequently occur. After making a food-related decision, the consumer faces consequences for that decision, and these are linked to memories and learning about a given food, consequently affecting central integration re that food. Figure 1, from Cardello (1994), depicts a schematic model of food-related behaviors:

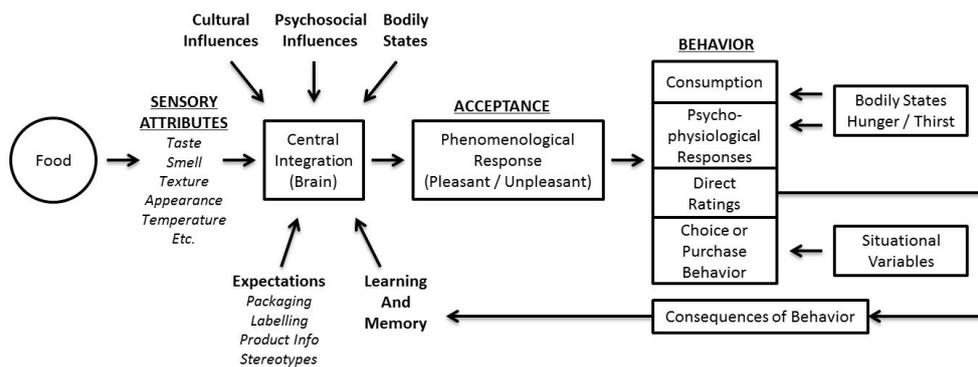


Figure 1. Schematic model of food-related behaviors (Cardello, 1994)

Stroebele & De Castro (2004) have examined the general environmental factors contributing to food-related consumer behavior, including social variables, surroundings, lighting, and temperature, as well as immediate environmental factors that also contribute to such behavior, including the color and smell of a food; most important of all these factors, however, is food color, which affects food identification and evaluation (Stroebele & De Castro, 2004). For example, when orange juice was offered to consumers in various colors, adulterated (green) orange juice reduced consumer acceptance compared with unadulterated orange juice, therefore reducing consumer choice (Tepper, 1993). Furthermore, color affects taste

sensations: Pangborn (1984) found that the amount of sweetness consumers experienced when drinking orange juice was influenced by the juice's color; the sampled consumers said the same juice was sweeter when its color was brighter. Stillman (1993) conducted an experiment using different-colored raspberry and orange juice to examine consumer flavor identification. Participants evaluated fruit-flavored beverages in different colors, such as red, orange, and green. Results showed that color had a significant impact on participants' perceptions and identifications of the beverages' flavors. When the amounts of coloring and flavoring were increased, the accuracy of identification accordingly increased. In this way, color influences consumer food identification and creates expectations. Moreover, color plays a key role in food choice by influencing taste thresholds, perceived sweetness, food preferences, sensations of pleasantness, and acceptability (Clydesdale, 1993).

2. Food and Color

Color is considered an important factor in food-related research. Thus far, the main focus in food-color research has been on consumer acceptance and identification of food taste and flavor, yet during the food-acceptance and -identification processes, consumer behavior is also influenced by psychological factors. In this regard, color plays a role not only in giving the consumer clues with which to guess flavor and taste but also in eliciting expectations and cuing food choice.

For this reason, the present study has reviewed previous research that examines the relationship between food and its color. Table 1 lists the studies reviewed in this paper. The listed papers are arranged by study approach and the variables each study examined.

Table 1. Literatures on food and color

Literature	Approach	Independent variable	Dependent variable
Maga (1974)	E	Beverage color	Taste thresholds (sweet, bitter, sour)
Moskowitz (1978)	E	Inadequate food color	Satisfaction
DuBose et al. (1980)	E	Food color, flavor levels	Flavor identification, flavor intensity, hedonic quality
Tuorila-Ollikainen (1982)	E	Beverage color	Pleasantness
Christensen (1983)	E	Food color	Intensity of aroma and flavor, texture quality
Pangborn (1984)	E	Brightness of color	Perceived sugar contents
Walford (1984)	T, E	Flavor and color	Flavor identification
Zellner et al. (1991)	E	Appropriate, inappropriate, and blindfolded color	Odor identification and preference
Tepper (1993)	E	Color variation	Food acceptance, flavor, sweetness perception
Stillman (1993)	E	Appropriate color, unusual color	Flavor identification
Clydesdale (1993)	T	Effect of color	Taste threshold, sweetness perception, food preference, pleasantness and acceptability
Cardello (1994)	T	Expectation	Food acceptance
Oram et al. (1995)	E	Color-flavor association	Drink identification
Lavin & Lawless (1998)	E	Prior experiences about the color and odor	Judgments of sweetness

Garber et al. (2000)	E	Beverage color	Flavor identification
Bayarri et al. (2001)	E	Beverage color	Sweetness and fruit flavor intensity
Zellner & Durlach (2002)	E	Color variation	Perceived refreshment
Stroebele & De Castro (2004)	T	Influence of ambience such as color, sound, temperature, smell and time	Food intake, choice
Stevenson & Oaten (2008)	E	Appropriate and inappropriate beverage color	Odor discrimination
Levitan et al. (2008)	E	Color-flavor association	Discrimination of the flavor
Spence et al. (2010)	T	Food color	Taste and flavor perception

E : Experimental approach

T : Theoretical approach

Most previous studies on food utilize experimental approaches to examining the effects of color on food perception. Inadequate food color, they have found, influences flavor identification and the perceived contents of a food or beverage (Maga, 1974; DuBose et al., 1980; Pangborn, 1984; Tepper, 1993; Stillman, 1993; Oram et al., 1995; Lavin & Lawless, 1998). Zellner et al. (1991) show that color congruity influences smell identification, and thus, it is connected to food preference. Food and beverage colors affect sensory determinations, such as sweetness, bitterness, and sourness (Maga, 1974; Bayarri et al., 2001).

Other studies, meanwhile, have been based on psychological, cognitive, and behavioral theory, and these have investigated the

psychological role color plays in influencing consumer behaviors like food choice and making a purchase. Additionally, Moskowitz (1978) and Tuorila-Ollikainen (1982) investigated the effect of food and beverage color on consumer behaviors like feeling satisfied and pleased. Inadequate food color reduces the consumer's satisfaction with a product, and adequate beverage color causes pleasant feelings.

Yet other studies attempt to organize and integrate the theoretical aspects of color's effects on food (Walford, 1984; Clydesdale, 1993; Cardello, 1994; Stroebele & De Castro, 2004; Spence et al., 2010). These studies focus on theoretical models and the process by which consumers' food-related behaviors operate. Cardello (1994) introduces a schematic model for food-related behavior that fully integrates the decision process, from food experience to food choice. Clydesdale (1993) reviews various studies on food color and organizes them according to the effects of color on food perception each examines. Still other studies explain the expectations created by color and their effects on consumer behavior.

In summary, most studies on food color focus on experimental approaches to examining the effects color has on a number of factors, and there is not much literature on role color plays in determining consumer food choices. Flavor and smell identification and flavor intensity and differentiation are somewhat removed from consumers' conscious attitudes. This study, therefore, focuses on how color affects consumer evaluations of beverages.

III. Theoretical Framework

1. The Influence of Expectation on Consumer Behavior

Expectation is sometimes more important than the product itself (Cardello, 1994), and many studies investigate the effects of expectation on purchasing behavior. For example, using MIT-branded beer, Lee et al. (2006) found that a product's brand had an effect on eliciting expectations; when the study's participants were told the beer was made by a famous research institute they showed a greater preference for the MIT-branded beer than for generic beer. Participants had specific expectations of what their consumption experiences with the MIT beer would be, and these affected their actual experiences. Meanwhile, Ares & DeZila (2010) found that packaging plays a role in attracting consumers and in the creation of hedonic expectations. Such expectations influence product perception and willingness to buy. Indeed, participants formed specific sensual expectations based on the shape and color of test product's packaging.

According to Garber et al. (2000), expectation helps the consumer identify food and connects food choice to food taste. Before consumers form preferences or make decisions, expectation forces them to evaluate food in advance. As shown earlier in Figure 1, various factors classified as expectations can be linked to causing emotional responses and are, consequently, linked to consumer behavior. Figure 2 illustrates the process, from forming expectations based on food color to the consumer's purchase response.

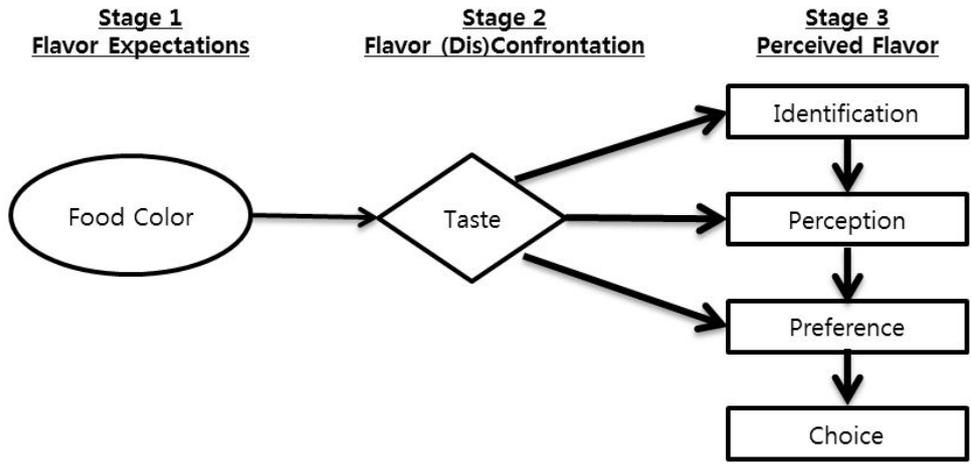


Figure 2. The relationship between the three forms of flavor information and their effects on stages of consumer choice (adapted from Garber et al., 2000)

Color is defined as a vivid, affect-loaded visual factor (Cheskin, 1957), and color conveys important symbolic and associative information about a product’s category and specific brand (Hine, 1995). Various studies investigate the effect color has on expectation and consumer response. Consumers’ expectations of and attitudes toward foods and beverages depend partly on these products’ colors (Clydesdale, 1993). Zellner & Durlach (2002) found that beverages with clear, strong colors, such as red and orange, cause the consumer to expect those beverages will be refreshing. Prior experiences with color and flavor accumulate to contribute to expectation-driven taste (Lavin & Lawless, 1998). Even children evaluate red jelly as a strawberry flavor.

In this way, the expectations formed based on color strongly influence food identification and perceptions. For example, in one

experiment Walford (1980) found that participants perceived white ice cream as vanilla and brown ice cream as chocolate, despite their flavors' being the opposite. Moreover, people perceived red jelly as strawberry-flavored and yellow jelly as lemon-flavored. These kinds of phenomena are attributed to previous experiences, which engender specific expectations (Lavin & Lawless, 1998).

2. Expectancy Disconfirmation and the Assimilation-Contrast Effect

When consumers feel there is an incongruity between color and flavor they tend to fall prey to illusion. According to the Moskowitz (1978), when an inadequately colored buffet was offered to study participants they were dissatisfied because of the food's unsuitable color. Thus, in a food-related context, novel and inappropriate colors make it hard for accept consumers to accept pleasant tastes due color incongruity (Heckler & Childers, 1992; Garber et al., 2000).

The concept of Expectancy Disconfirmation is widely applied in many academic fields. In both consumer-marketing and information-systems research, expectations of what a product or service will be and disconfirmation of those expectations produce dissatisfaction in prospective consumers and user behavior (Oliver, 1980; Mckinney et al., 2002). Yi (1993) found that product ambiguity played a moderating role in causing Expectancy Disconfirmation. Unambiguous products, Yi found, allow

consumers to easily evaluate said products and, thus, lead to consumer satisfaction.

Oliver (1980) was the first to propose Expectancy Disconfirmation in his paper “A Cognitive Model of the Antecedents and Consequences of Satisfaction Decisions.” The difference between perceived performance and evaluation is connected to confirmation or disconfirmation of a product, and consequently, it leads to the satisfaction or dissatisfaction of consumers. This study therefore hypothesizes that consumers’ believing there is an incongruity between color and flavor will make them feel dissatisfied with a beverage.

There are three explanations for the dissatisfaction caused by the difference between an expected performance and the consumer’s actual evaluation of a product: the so-called Assimilation-Contrast Effect (Table 2; Anderson, 1973). The Assimilation Effect occurs when there is a small discrepancy and the level of satisfaction is determined in the same way as expected. When there is a large discrepancy between the perceived performance of a product and the consumer’s real evaluation of it, on the other hand, the Contrast Effect occurs, and thus, consumers evaluate the product much more or less favorably than expected. Finally, the Assimilation-Contrast Effect indicates that these two effects are not a mutually exclusive and both can be taken in terms of product perception and evaluation. Moreover, the Assimilation-Contrast Effect can vary, depending on the level of discrepancy (Anderson, 1973; Lee et al., 2006). In short, the

discrepancy between expectations and an objective evaluation of a product's performance will be minimized or assimilated based on the consumer's perceptions (Anderson, 1973). This study adopts the Assimilation-Contrast Effect to explain the role color plays as a cue for decisions on the level of expected flavor in a beverage.

Table 2. Definition of effects of disparity between expectations and actual product performance (Anderson, 1973)

Effect	Definition
Assimilation	Any discrepancy between expectations and product performance will be minimized or assimilated by the consumer's adjusting his perception of the product to be more consistent with his expectations
Contrast	Customer will magnify the difference between the product received and the product expected; i.e., if the objective performance of the product fails to meet his expectations, the customer will evaluate the product less favorably than if he had no prior expectations for it
Assimilation-Contrast	There are zones or latitudes of acceptance and rejection in consumer perceptions. If the disparity between expectations and product performance is sufficiently small to fall into the consumer's latitude of acceptance, he will tend to assimilate the difference by rating the product more in line with expectations than its objective performance justifies. However, if the discrepancy between expectations and actual product performance is so large that it falls into the zone of rejection, then a contrast effect comes into play and the consumer magnifies the perceived disparity between the product and his expectation for it

In this regard, the Assimilation-Contrast Effect can influence the level of satisfaction and dissatisfaction based on prior expectations. When consumers feel there is only a small discrepancy between their expectations and evaluations, the Assimilation Effect occurs, and they perceive the

product in accordance with their original expectations. However, when consumers feel a big discrepancy exists, the Contrast Effect occurs, and they evaluate the product much less favorably than they expected to.

IV. Research Model and Hypotheses

1. Research Model

According to the existing literature and conceptual framework, the present study proposes the following research model and hypotheses (Figure 3):

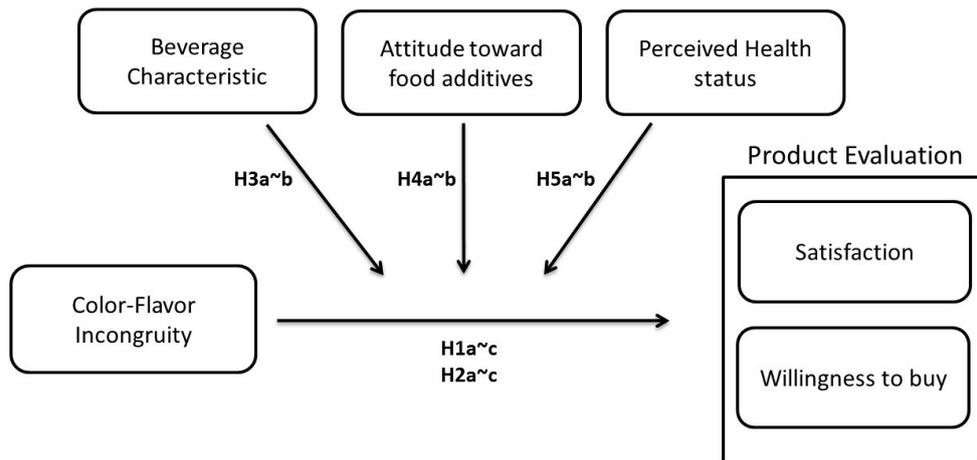


Figure 3. Research model of the study

2. Hypotheses Development

2.1 The effect of color on consumer behavior

Based on the findings of previous studies, the present study proposes the following research model and hypotheses: first, based on the Oliver's (1980) Expectation Disconfirmation Theory and Garber et al.'s (2000) conceptual framework, this study hypothesizes that when a beverage's color and flavor are incongruent the consumer's evaluation of said beverage (i.e.,

the consumer's satisfaction and willingness to buy) decrease according to the level of disappointed expectancy. Furthermore, this study contends that giving consumers a cue to help them make proper expectations diminishes disappointment and increases favorable evaluations, as per the Assimilation-Contrast Effect (Anderson, 1973). In this study, a red beverage in a red bottle serves as the epitome of an adequate flavor-expectation balance. The following list summarizes the present study's hypotheses:

- H1a. Satisfaction with a colored beverage in a transparent bottle will not differ from satisfaction with a transparent beverage in a colored bottle.*
- H1b. Satisfaction with a colored beverage in a transparent bottle will be greater than satisfaction with a transparent beverage in a transparent bottle.*
- H1c. Satisfaction with a transparent beverage in a colored bottle will be greater than satisfaction with a transparent beverage in a transparent bottle.*
- H2a. The willingness to buy a colored beverage in a transparent bottle will not differ from the willingness to buy a transparent beverage in a colored bottle.*
- H2b. The willingness to buy a colored beverage in a transparent bottle will be greater than the willingness to buy a transparent beverage in a transparent bottle.*

H2c. The willingness to buy a transparent beverage in a colored bottle will be greater than the willingness to buy a transparent beverage in a transparent bottle.

2.2 The moderating effects of beverage characteristic, attitudes toward food additives, and perceived health status

When there is a main effect due to bottle and beverage colors, utilitarian characteristic of the beverage are hypothesized to play a moderating role in making people feel healthier under certain conditions, and attitudes toward food additives and the consumer's perceived health status should also have moderating effects. Therefore, this study hypothesizes as follows:

H3a. In the case of a transparent beverage in a transparent bottle, utilitarian characteristics will positively influence satisfaction when compared with other conditions.

H3b. In the case of a transparent beverage in a transparent bottle, utilitarian characteristic will positively influence willingness to buy when compared with other conditions.

H4a. In the case of a transparent beverage in a colored bottle, as negative attitudes toward food additives increase satisfaction will increase when compared with other conditions.

- H4b. In the case of a transparent beverage in a colored bottle, as negative attitudes toward food additives increase willingness to buy will increase when compared with other conditions.*
- H5a. In the case of a colored beverage in transparent bottle, as the consumer's perceived health status increases satisfaction will increase when compared with other conditions.*
- H5b. In the case of a colored beverage in a transparent bottle, as the consumer's perceived health status increases willingness to buy will increase when compared with other conditions.*

V. Research Methodology

1. Measurement Development

All constructs and indicators used in this study are adopted from previous research. Variable operationalization is shown in Table 3.

Hedonic and utilitarian characteristics of a beverage

Most research on hedonic and utilitarian characteristics concentrates on the consumer's consumption goal. Value is evaluated based on sensual pleasure and the need for pleasure and enjoyment during consumption as a hedonic consumption goal (Leclerc et al., 1994). The utilitarian consumption goal emphasizes a product's function or the completion of a cognitive, instrumental, goal-directed and functional task (Strahilevitz & Myers, 1998).

When it comes to making a purchase, then, the consumer's consumption goal can be influenced by a product's characteristics, regardless of whether the product is hedonic or utilitarian. Especially in regards to products that require little involvement, such as beverages and cookies, one can infer that consumers are affected by a product's own attributes, independent of specific consumption goals. Research into hedonic and utilitarian product characteristics has been conducted using instruments to measure the extent to which participants perceive these attributes (Leclerc et al., 1994; Voss et al., 2003). Leclerc et al. utilized a hedonic-to-utilitarian scale to measure a product's hedonism and

utilitarianism. Similarly, Voss et al. (2003) developed a hedonic-to-utilitarian scale to validate and generalize the measure of hedonic and utilitarian constructs. This study adopts the hedonic-to-utilitarian scale from Leclerc et al. The scale's measure is applied as a *consumer attitude* dimension and focuses on product categories and different brands. As a result, latent hedonic and utilitarian variables turn out to be two distinct attitude dimensions.

Consumer attitude: Satisfaction and willingness to buy

There are numerous examples of previous research into means of measuring consumer satisfaction. Satisfaction is an emotional evaluation of a product or service (Hunt, 1977). To measure satisfaction, both single- and multi-item measures are used and both methods have their pros and cons (Lee, 2004).

Westbrook (1980) used the *Delighted-Terrible* (D-T) scale to measure satisfaction with a single measurement method. Taylor & Baker (1994), in contrast, employed three direct indicators to measure consumer satisfaction, and this multi-scale approach enhanced the reliability of their attitude measurements. Later, Juhl et al. (2002) measured customer satisfaction using three indicators: *overall satisfaction*, *expectation*, and *comparison with ideal product*. Finally, Dodds et al. (1991) used five indicators to measure willingness to buy.

This study employs Juhl et al.'s (2002) multiple-item measure and Dodds et al.'s (1991) willingness-to-buy measures, adapting three of Dodds et al.'s (1991) indicators to suit beverage-purchasing situations. The two price-related items from Dodds et al.'s (1991) original measure are deleted for this study, and consumer satisfaction from Juhl et al.'s (2002) study is conceptualized as an overall evaluation of the test beverage.

Attitudes towards food additives

Based on research into consumer lifestyles, this study focuses on the consumer's food-related lifestyle. Brunso & Grunert (1995) introduced the *food-related lifestyle* (FRL) measurement, as FRL can affect the consumer's food-related decision making. Since this measurement's introduction, several studies have been conducted in Eastern and Western countries to generalize and validate it (Grunert et al., 1998; Grunert et al., 2001; Fang & Lee, 2009; Grunert et al., 2011; Kim, 2012).

Grunert et al. (2011) introduced a concise FRL instrument and applied it to studying Chinese consumers' food-buying habits. The original FRL measurement had five major components covering every aspect of the food related-lifestyle concept: *way of shopping, quality aspects, cooking methods, consumption situation, and purchase motives*. The present study adapts the *attitude towards food additives* measure from Grunert et al.'s (2011) FRL instrument to measure latent variables.

Perceived health status

Two methods are widely used in health research to measure an individual's health status: *self-rating*, *expert measurement* (Kaplan & Camacho, 1983). Kaplan & Camacho (1983) used a single-item, self-rated method to check the subjective health statuses of their study's subjects. Speake et al. (1989) later developed a multi-item, subjective health-status perception measure consisting of *current health status*, *health status compared with the past*, and *health status compared with those of the same age group*. This study adopts Kaplan & Camacho's (1983) perceived health-status measurement.

Table 3. Operationalization of variables

<i>Hedonic/Utilitarian</i>		
HU	the degree to which the product possessed utilitarian and hedonic features	Leclerc et al., (1994), Ha & Yoon (2007)
<i>Satisfaction</i>		
SAT1	Considering all your experience with this beverage, how satisfied are you, in general?	Juhl et al. (2002)
SAT 2	To what degree did this beverage fulfill your expectations?	
SAT 3	Imagine a beverage which is perfect in all aspects. How close to this ideal do you consider this beverage to be?	
<i>Willingness to buy</i>		
WTB1	The likelihood of purchasing this beverage is	Dodds et al. (1991)
WTB2	The probability that I would consider buying this beverage is	
WTB3	My willingness to buy this beverage is	
<i>Attitude toward food additives</i>		
ATF1	I like to buy natural food, e.g. those that do not contain preservatives	Grunert et al. (2011), Kim (2012)
ATF2	For me, the naturalness of the food I buy is important quality factor	
ATF3	I would like to avoid eating food that contains additives	
<i>Perceived Health Status</i>		
HS	How would you rate your overall health on a scale of one to ten?	Kaplan & Camacho (1983);

2. Experiment Design

This study was designed to take place between subjects (Between-subject design). In conducting the tasting experiment, the experiment-design method for sensory evaluation of Lawless & Heymann (2010) was used. The preference experiment for food and beverage products and the appropriate environment for sensory evaluation are detailed in Lawless & Heymann (2010).

To test this study's hypotheses, six product-characteristic conditions, plus beverage and bottle color, were used. Product characteristics fall into two categories, hedonic and utilitarian. Beverage samples were divided into three conditions, based on the various combinations of bottle and beverage color (Figure 4). The first combination (Group 1) was a red, strawberry-flavored beverage in a clear bottle. The second combination (Group 2) was a transparent, strawberry-flavored beverage in a red bottle. The third combination (Group 3) was a transparent, strawberry-flavored beverage in a transparent bottle.

Red coloration and strawberry flavoring were used in this study to stimulate associations between the color red and the flavor of strawberries. Red was also used in this study because it is the color most widely used in color taste-interaction research (Lavin & Lawless, 1998). According to the same research, the majority of consumers associate the color red with the flavor of strawberries.



Figure 4. Three conditions of the study

The three tested beverage conditions differed in terms of bottle and beverage color, but all three combinations tasted the same, as strawberry-flavoring was fixed as an experimental control in this study. As previously mentioned, too, red is strongly associated with the flavor of strawberries; therefore, the color red was also fixed as a control, thereby enhancing the expectation of strawberry flavoring. The first beverage condition, a red, strawberry-flavored beverage in a transparent bottle, was designed not to be unusual for the study's participants but is, instead, similar to a real product currently available in stores. The second condition, a transparent beverage, was designed to seem strange to participants, as it was different from all currently available products, but this study posits that the bottle's red color would make participants expect the beverage to taste like strawberries. The third condition was designed to prevent participants from developing flavor expectations, as it gave no clue as to its contents; participants would, this study hypothesizes, feel a sense of abnormality after tasting this third beverage.

Beverage samples used in this study were made from water, lemonade and legally permissible food additives, including edible flavoring, fructose, and pigments (when applicable). The formula for this study's test beverage is as follows: 100 ml of water, 100 ml of lemonade, 6 gm of crystalline fructose, 0.5 gm of edible strawberry flavoring, and 0.2 gm of edible, red food coloring (when applicable). Based on these percentages, each participant was offered approximately 180 ml (about 6 oz.) of beverage in a 250 ml bottle (about 8.4 oz.).

To ensure safety a food-additive specialist and food manufacturer advised this study's authors on making the test beverage. Additionally, because this study is concerned with behavioral research involving humans, the Institutional Review Board (IRB) of Seoul National University (SNU) reviewed this study's proposed methods prior to testing (IRB No. 1411/001-023).

3. Experiment Process

To recruit participants, help-wanted advertisements for consumer-market research subjects were posted on an online bulletin board. That the present study is concerned with consumer-market research for new beverage products was emphasized to conceal the study's primary purpose. Subsequently, 300 participants were spontaneously recruited via said bulletin board's online recruitment system. A randomized block design was

used to test six different conditions, and each of the 300 recruited participants was assigned to a timeslot of her choosing. The six conditions were equally and randomly assigned in keeping with the study's randomized, between-subject design.



Figure 5. Experiment process

Figure 5 represents the experiment process. Participants were told to imagine they are part of a consumer-market research test for new beverage prior to its launch. First, to manipulate participants' expectations about the test, they were instructed to read a description of the new beverage's characteristics. When they finished reading this description, they were offered a beverage sample and instructed to taste it. They were manipulated with six characteristics: two product characteristics (hedonic and utilitarian), times three bottle- and beverage-color combinations (transparent and red, red and transparent, and transparent and transparent, respectively).

After tasting each beverage, participants answered a series of questions about the product's characteristics, including whether they viewed it as hedonic or utilitarian, what their attitudes toward the beverage were (i.e., if they were satisfied and if they were willing to buy it), and how they

viewed health-related variables (i.e., their attitudes toward food additives and their perceived health statuses).

Finally, demographic information was collected, and to filter out participants who guessed the study's real purpose, a question about the study's purpose was asked. After the experiment, all participants were rewarded with a \$3 meal coupon for their participation.

VI. Data Analysis and Results

1. Data Collection

This study adopted an experimental approach to collecting data and verifying its hypotheses. Experiments were conducted in an on-campus meeting room equipped for testing the study’s beverage and conducting its survey. Participants were recruited via an online recruitment system, and most were undergraduate and graduate students. All participants were given adequate information about the experiment, in accordance with the terms of the IRB.

A total of 300 responses were collected, and 280 of these (excepting 20 unusable responses) were analyzed. Unusable responses were classified based on three criteria: (1) eight participants showed a strong repulsion to the beverage sample, (2) seven samples had a manipulation problem, (3) five respondents were insincere participants. The between-subject experimental block design and the number of responses are shown in Table 4.

Table 4. Number of responses

		Usable			Unusable		
Beverage Color	Red	Transparent	Transparent	(1)	(2)	(3)	
Bottle Color	Transparent	Red	Transparent				
Hedonic	44	47	47	5	5	2	
Utilitarian	49	44	49	3	2	3	
Sum	93	91	96	20			

2. Sample Characteristics

Demographic characteristics are shown in Table 5. The majority of subjects were between 21 and 25 years old (53.2%), and male and female participants accounted for 52.1% and 47.1% of the sample population, respectively. In terms of job status, a majority of participants were students (82.8%).

Table 5. Demographic characteristics (N=280)

	Profile Category	N	%
Age (AVG=23.2, SD=4.053)	18-20	61	21.8
	21-25	149	53.2
	26-30	50	17.9
	31 or higher	18	6.4
	Left blank	2	0.7
Gender	Male	146	52.1
	Female	132	47.1
	Left blank	2	0.7
Education	High school diploma or less	4	1.4
	Undergraduate	191	68.2
	College graduate	37	13.2
	Graduate student or more	46	16.4
	Left blank	2	0.7
Job status	Student	229	81.8
	Office worker	27	9.6
	Specialized job	17	6.1
	Other	5	1.8
	Left blank	2	0.7

3. Assessment of Measurement Model

Data analysis in the present study was performed using PLS method for the assessment of measurement model and t-test, ANOVA for testing the hypotheses (using PLS-graph and SPSS 20).

For the assessment of measurement, the current study performed reliability test and the construct validity test. For performing reliability test, the study utilized composite reliability and Cronbach's Alpha to assess internal consistency of the latent variables. To identify construct validity, both convergent validity and discriminant validity were investigated. Factor loadings and Average Variance Extracted (AVE) were investigated to test the convergent validity, and the square root of AVE was used to verify the discriminant validity.

3.1 Reliability Test and Convergent Validity Test

Composite Reliability (CR) test and Cronbach's Alpha was conducted to verify the internal consistency of each latent variable. According to Werts et al. (1974), values greater than 0.70 in CR imply that a construct retains both its internal consistency and convergent validity. As shown in Table 6, all the constructs passed threshold of reliability test.

The factor loadings and AVEs were investigated to verify convergent validity. The acceptable points of validity are factor loadings greater than 0.70 and an AVE greater than 0.50 (Fornell and Larcker, 1981; Gefen et al., 2005). All the factor loadings of individual items were greater than 0.70

which is the threshold and all the AVEs of latent variables were greater than 0.50 as well.

Table 6. Reliability and Convergent validity check

Constructs	Items	Factor Loading	AVE	C.R.	Cronbach's Alpha
Satisfaction	SA1	0.8618	0.739	0.895	0.815
	SA2	0.8717			
	SA3	0.8460			
Willingness to buy	WB1	0.9286	0.829	0.935	0.896
	WB2	0.8824			
	WB3	0.9191			
Attitude toward food additives	FL1	0.8712	0.738	0.894	0.819
	FL2	0.8892			
	FL3	0.8159			

3.2 Discriminant Validity Test

The square root of AVE table was utilized to examine the discriminant validity. According to Fornell and Larcker (1981), the square root of AVE should be greater than the correlations among the constructs. Thus, the amount of variance shared between the constructs implies the discriminant validity (Gefen and Straub, 2005). Following Table 7 shows the ratio of the square root of the AVE of each latent variable over the correlations of this variable with respect to all the other variables. All the values of square root of AVE which are on the diagonal part of the table are greater than any other constructs below. Therefore, each latent variable is more highly correlated with its indicators than with any other constructs.

Table 7. Correlations of the latent variables and the square root of the AVE

Latent Variables	(1)	(2)	(3)	(4)
(1) Satisfaction	(0.860)			
(2) Willingness to buy	0.787	(0.910)		
(3) Attitude toward food additives	0.142	0.199	(0.859)	
(4) Perceived health status	0.057	0.014	0.058	(1.000)

Table 8. Descriptive statistics of dependent variables

Construct		N	Min.	Max.	Average	S.D.
Manipulation (H/U)		279	1	7	3.839	1.333
Attitude toward food additives	ATF1	280	1	5	3.682	0.937
	ATF 2	280	1	5	3.525	1.009
	ATF 3	280	1	5	3.443	1.076
Perceived Health Status	PHS	280	3	10	6.925	1.546
	SAT1	280	1	5	3.511	0.743
Satisfaction	SAT2	280	1	5	3.164	1.010
	SAT3	280	1	5	3.004	0.814
	WTB1	280	1	5	3.007	0.920
Willingness to buy	WTB2	280	1	5	3.400	0.930
	WTB3	280	1	5	3.004	0.960

4. Manipulation Check

Before analyzing the effects of independent variables on consumer responses, the manipulation of product characteristics was checked (Table 9).

Table 9. Manipulation check for beverage characteristics

Beverage Characteristics	N	Average	S.D.	Statistics
Hedonic	138	4.8696	8.07341	t=1.992, df=278, p<0.05
Utilitarian	142	3.5000	1.37738	

Note: two-tailed test

As mentioned above, product-characteristic manipulation was divided into two groups, according to whether the product characteristic was hedonic or utilitarian. Using a seven-point Likert scale, this study found the average hedonic- and utilitarian-manipulation values were 4.8696 and 3.5000, respectively. There was a significant difference between the two groups ($t = 1.992$, $df = 278$, $p < 0.05$), meaning that participants perceived hedonic and utilitarian characteristics differently.

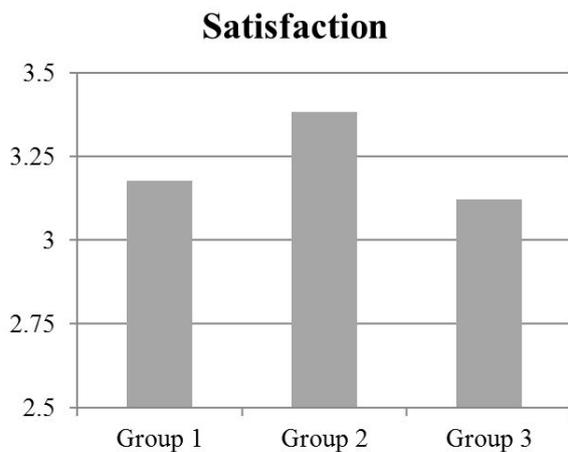
5. Hypothesis Test

5.1 Main effect of color on beverage evaluation

To examine the color's main effect on consumer response to the test beverage, this study performed a variance analysis (VA).

Satisfaction (H1a ~ c)

Figure 6 illustrates the descriptive statistics for satisfaction with this study's three beverage groups. As mentioned before, *Group 1* indicates that participants were offered a red beverage in a transparent bottle, *Group 2* means participants were given a transparent beverage in a red bottle, and *Group 3* implies a transparent beverage in a transparent bottle. Average satisfaction for each group was 3.1792 (Group 1), 3.3846 (Group 2), and 3.1215 (Group 3). Statistical differences are analyzed below.



* Note: Group 1 (Red beverage in transparent bottle)

Group 2 (Transparent beverage in red bottle)

Group 3 (Transparent beverage in transparent bottle)

Figure 6. Average satisfaction of three groups

As illustrated in Table 10, the results of the one-way, between-groups VA show that satisfaction with the three beverages was significantly different among the three groups ($F_{(2,277)} = 3.248, p < 0.05$). To analyze this effect in detail, the present study conducted a post-hoc analysis (LSD), the results of which show that there were significant differences in satisfaction between the groups, indicating a 5% difference between the second (transparent beverage in a red bottle) and third (transparent beverage in a transparent bottle) conditions.

Table 10. Difference in Satisfaction of different groups

Group	N	Average	S.D.	F	p	Post-hoc: LSD		
						1	2	3
1	93	-.067	.927				-.281590	.070245
2	91	.214	1.052	3.248	.040	.281590		.351834*
3	96	-.137	1.000			-.070245	-.351834*	

* $p < 0.05$

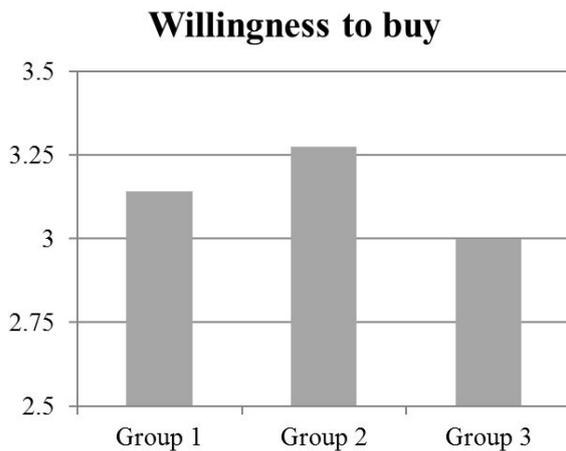
* Note: Group 1 (Red beverage in transparent bottle)

Group 2 (Transparent beverage in red bottle)

Group 3 (Transparent beverage in transparent bottle)

Willingness to buy (H2a ~ c)

Figure 7 shows descriptive willingness-to-buy statistics for the three beverage groups. Average willingness to buy for each group was 3.1434 (Group 1), 3.2747 (Group 2), and 3.0000 (Group 3). Statistical differences are analyzed below.



* Note: Group 1 (Red beverage in transparent bottle)

Group 2 (Transparent beverage in red bottle)

Group 3 (Transparent beverage in transparent bottle)

Figure 7. Average willingness to buy of three groups

The results of the one-way, between-groups VA are illustrated in Table 11. There was a significant difference in willingness to buy among the three groups ($F_{(2,277)} = 2.430$, $p < 0.10$), and the results of a post-hoc analysis also show that there was a significant difference in willingness to buy between groups, indicating a 5% difference between the second

(transparent beverage in a red bottle) and third (transparent beverage in a transparent bottle) conditions.

Table 11. Difference in Willingness to buy of different groups

Group	N	Average	S.D.	F	p	Post-hoc: LSD		
						1	2	3
1	93	.007	.969				-.154787	.166514
2	91	.162	1.031	2.430	.090	.154787		.321301*
3	96	-.160	1.002			-.166514	-.321301*	

* $p < 0.05$

* Note: Group 1 (Red beverage in transparent bottle)

Group 2 (Transparent beverage in red bottle)

Group 3 (Transparent beverage in transparent bottle)

5.2 Moderating effects of other factors on satisfaction and willingness to buy

As mentioned earlier, various factors affect food-related consumer behavior (Stroebele & De Castro, 2004; Cardello, 1994). After determining color's main effect, this study examined the moderating effects of other factors on dependent variables. This study divided participants into two groups according to product characteristics (i.e., whether the beverage was hedonic or utilitarian), and to investigate the moderating effects of beverage characteristics, attitudes toward food additives, and participants' perceived health statuses, this study performed a multiple-regression analysis. The results of this analysis are illustrated in Tables 12 and 13. Six multiple

regressions were conducted, according to the study's manipulation conditions.

Product characteristics (H3a ~ b)

This study hypothesizes that, in case of the transparent beverage in a transparent bottle (third condition), utilitarian characteristics will positively influence the dependent variables compared with the other conditions. Results show there was a significant effect on satisfaction ($B = 0.284$, $p < 0.05$) alone.

Attitude towards food additives (H4a ~ b)

This study hypothesizes that, in case of the transparent beverage in a red bottle (second condition), as negative attitudes toward food additives increase dependent variables will increase compared with other conditions. Results show there were significant effects on both satisfaction ($B = 0.284$, $p < 0.05$) and willingness to buy ($B = 0.385$, $p < 0.01$).

Perceived health status (H5a ~ b)

This study hypothesizes that, in case of the red beverage in a transparent bottle (first condition), as participants perceived health statuses increase dependent variables will increase compared with other conditions. Results show there was a significant effect on satisfaction ($B = 0.250$, $p < 0.05$) alone.

Table 12. Multiple regression in terms of satisfaction

Beverage color		Red		Transparent		Transparent	
Bottle color		Transparent		Red		Transparent	
		B	p-value	B	p-value	B	p-value
CV	Age	.113	.311	-.305*	.004	-.037	.725
	Gender	-.126	.254	-.215*	.036	-.174*	.098
IV	Hedonic/Utilitarian	.230*	.033	.224*	.023	.284*	.009
	Attitude toward food additives	.134	.247	.352*	.001	.116	.254
	Perceived health status	.250*	.020	-.012	.907	-.034	.731
F		F _(5,86) = 2.529*		F _(5,85) = 4.779*		F _(5,89) = 2.850*	
p-value		.035		.001		.020	
R ²		.077		.174		.090	

* p < 0.05

Table 13. Multiple regression in terms of willingness to buy

Beverage color		Red		Transparent		Transparent	
Bottle color		Transparent		Red		Transparent	
		B	p-value	B	p-value	B	p-value
CV	Age	.035	.761	-.269*	.010	-.230*	.033
	Gender	-.121	.285	-.245*	.017	-.171	.106
IV	Hedonic/Utilitarian	.097	.374	.231*	.018	.116	.279
	Attitude toward food additives	.226	.058	.385**	.000	.191	.066
	Perceived health status	.154	.159	-.065	.509	-.115	.257
F		F _(5,86) = 1.584		F _(5,85) = 5.077**		F _(5,89) = 2.483*	
p-value		.173		.000		.037	
R ²		.031		.185		.073	

* p < 0.05, ** p < 0.01

VII. Discussion

1. Summary of Findings

The main goal of this study is to examine the effects of color and edible pigment on consumer behavior. To achieve this goal, this study examined (1) consumer attitudes toward edible pigment, (2) the effect of expectation in terms of color incongruity on satisfaction with a product, and (3) how health-related factors affect consumer responses like satisfaction and willingness to buy. To verify this study's hypotheses its authors conducted a tasting experiment with a between-subject design, and 300 responses were collected. The data were analyzed using a one-way ANOVA, independent-sample t-test and multiple regressions. Table 14 illustrates a summary of the hypothesis test.

Table 14. The result of hypothesis test

	Hypothesis	Support
H1a	<i>Satisfaction with a colored beverage in a transparent bottle will not differ from satisfaction with a transparent beverage in a colored bottle.</i>	Supported
H1b	<i>Satisfaction with a colored beverage in a transparent bottle will be greater than satisfaction with a transparent beverage in a transparent bottle.</i>	Not Supported
H1c	<i>Satisfaction with a transparent beverage in a colored bottle will be greater than satisfaction with a transparent beverage in a transparent bottle.</i>	Supported
H2a	<i>The willingness to buy a colored beverage in a transparent bottle will not differ from the willingness to buy a transparent beverage in a colored bottle.</i>	Supported
H2b	<i>The willingness to buy a colored beverage in a transparent bottle will be greater than the willingness to buy a transparent beverage in a transparent bottle.</i>	Not Supported

H2c	<i>The willingness to buy a transparent beverage in a colored bottle will be greater than the willingness to buy a transparent beverage in a transparent bottle.</i>	Supported
H3a	<i>In the case of a transparent beverage in a transparent bottle, utilitarian characteristics will positively influence satisfaction when compared with other conditions.</i>	Supported
H3b	<i>In the case of a transparent beverage in a transparent bottle, utilitarian characteristic will positively influence willingness to buy when compared with other conditions.</i>	Not Supported
H4a	<i>In the case of a transparent beverage in a colored bottle, as negative attitudes toward food additives increase satisfaction will increase when compared with other conditions.</i>	Supported
H4b	<i>In the case of a transparent beverage in a colored bottle, as negative attitudes toward food additives increase willingness to buy will increase when compared with other conditions.</i>	Supported
H5a	<i>In the case of a colored beverage in transparent bottle, as the consumer's perceived health status increases satisfaction will increase when compared with other conditions.</i>	Supported
H5b	<i>In the case of a colored beverage in a transparent bottle, as the consumer's perceived health status increases willingness to buy will increase when compared with other conditions.</i>	Not Supported

H1a-c and H2a-c are connected to the effects of color and expectation on consumers' evaluations of the tested beverages. As shown in Table 14, most of this study's initial hypotheses were supported. The only hypothesis not supported was "Satisfaction with and willingness to pay for the red beverage in a transparent bottle will be higher than satisfaction with and willingness to pay for the transparent beverage in a transparent bottle" (H1b, H2b). This study also hypothesizes that when there is an appropriate cue, such as red coloration, to engender expectation, consumers will easily infer a beverage's flavor. Thus, the study predicts that evaluation for the red beverage in a transparent bottle will be better than that for the transparent

beverage in a transparent bottle. However, while results show that there was a tendency to confirm this hypothesis, a statistically significant difference was not confirmed.

Furthermore, this study's result shows that color and edible pigment had an effect on participants' evaluations of the test beverages. This phenomenon can be explained as being a result of color-flavor incongruity and Expectation Disconfirmation. That is, when there was a noticeable incongruity between color and flavor, satisfaction and willingness to buy decreased because flavor expectations for a given beverage did not match the participants' experiences. This phenomenon can be also explained as being a result of the Assimilation-Contrast effect. Participants evaluated the transparent beverage under the influence of the Contrast Effect. However, when a red bottle was used to elicit adequate expectation, satisfaction and willingness to buy increased. By forming expectations of a beverage's flavor, participants evaluated the beverage under the influence of the Assimilation Effect. Bottle color, moreover, mitigated the effect of beverage color-flavor incongruity; therefore, participants formed the proper expectations in such cases. Although participants felt a certain degree of incongruity because of the beverage's transparent color, they could form expectations of the product's flavor due to the color of its bottle.

H3a and H3b are connected to beverage-characteristics effects. In the case of the transparent beverage in a transparent bottle, beverage characteristics, be they hedonic or utilitarian, had an effect on participant

behavior. Beverage characteristics had a significant influence on satisfaction alone. When the product characteristics were utilitarian, satisfaction was higher than satisfaction for hedonic characteristics. In terms of willingness to buy, utilitarian characteristics had no significant effect.

H4a-b and H5a-b are connected to the effect of attitudes toward food additives and individuals' perceived health statuses. Both affected the responses of this study's participants. As shown in Table 14, most hypotheses for this line of inquiry were supported. The only rejected hypothesis was "In the case of the red beverage in a transparent bottle, as the individual's perceived health status improves willingness to buy will increase compared with other conditions" (H5b). In the case of the transparent beverage in a red bottle, attitudes toward food additives had a positive effect on satisfaction and willingness to buy (H4a-b). When participants recognized the transparent beverage, attitudes toward food additives consequently made participants feel healthier and raised their satisfaction and willingness to buy. What's more, as their perceived health statuses increased, participants' satisfaction with the red beverage in a red bottle (H5a) increased. It can be inferred, then, that edible pigment has no effect on people who are confident about their health.

2. Contributions and Limitations

2.1 Theoretical implications

This study used cues to prompt participants into forming expectations about beverage flavors in order to conduct theoretical research into applying Expectancy Disconfirmation theory to the field of food production. Additionally, it examined the Assimilation-Contrast effect as a means of a product's recovering from reduced satisfaction and willingness to buy caused by Expectancy Disconfirmation. Prior research into Expectancy Disconfirmation focused on the products or services themselves and attempted to determine the consequences of disconfirmation such as dissatisfaction, and these studies suggested strategies for make expectancy-confirmative products and situations. This study provides a different perspective on antecedents that views disconfirmation in terms of food acceptance and evaluation. In this study, color was used to elicit adequate expectations of the flavor of a beverage. Moreover, giving a beverage adequate color, this study shows, had a significant effect on increasing participants' satisfaction and willingness to buy by instilling flavor expectations in the study's subjects. Therefore, this study suggests one way a product might recover positive consumer responses when there is dissatisfaction because of Expectancy Disconfirmation.

Additionally, this study attempted to clarify the effects of beverage characteristics. Recently, there has been trend toward health consciousness, and a growing number of health-functional foods and beverages are

increasingly capturing market share. This study attempted to examine the effects of beverages' utilitarian characteristics and how these effects can be differentiated when compared with beverages' hedonic characteristics. This study found that attitudes toward food additives can have an effect on consumers' product evaluations. In this study, too, when adequate flavor expectations were inspired by a red bottle, attitudes toward food additives had a significant influence on participants' product evaluations. Therefore, health-related factors were shown to effect consumer choice behavior significantly.

Finally, the findings of this study are not limited to the field of food-related consumer behavior, and can be extended to a diverse number of other consumer-related marketing fields, as well as to product development. In the development stage, implementing adequate cues that instill proper expectations about a product and emphasize its positive characteristics can have an important impact on attracting consumers. Moreover, when there are factors that cause expectation incongruity for a product, incorporating other cues that confirm expectations can be one way of improving consumer satisfaction.

2.2 Practical implications

This study helps practitioners understand the effects of color so that they can apply this factor to their customer-service and product-development processes. The results of this study show that, when a beverage

in a colored bottle is offered, satisfaction and willingness to buy were higher than under other conditions. Colored bottles, this study shows, inspire adequate expectations of a beverage's flavor, allowing consumers to easily guess the beverage's flavor and, therefore, causing them to evaluate it positively as a product. This gives practitioners important insight in that, when certain cues represent product characteristics or features a producer wants to emphasize, consumers can easily figure out the purpose of the product, thus improving their attitudes toward the product.

In terms of economic feasibility, the cost of using colored bottles is cheaper than the cost of dyeing a beverage using food coloring. Unlike edible pigment, colored plastic is reusable, and this can give an environmentally friendly face to producers. Moreover, producers can emphasize the natural characteristics of their products, thereby achieving two ends at once.

In this regard, the findings of this study are not limited to the effects of color. The concept of color was used as the way of prompting consumers to form appropriate expectations. The study's finding, however, have implications for the entire field of marketing in point-of-sale scenarios. By giving additional information about a product a producer wants to sell as a clue to its use, producers can help customers form proper expectations about said product, while consumers' more accurate expectations consequently result in intended, positive evaluations.

Finally, the last implication of this study's finding is that health-related variables have effects on consumers' satisfaction with and willingness to buy a product. According to these results, when the transparent beverage in a colored bottle was offered, as participants' concerns about food additives increased, their satisfaction and willingness to buy were increased. This means that emphasizing the health-related factors of a product can help health-conscious consumers better evaluate it. This effect can be maximized when a product's seller emphasizes the product's natural characteristics.

2.3 Limitations and future study

This study has several limitations that provide guidance for future research. First, most of the study's participants were undergraduate students in their twenties. This sampling issues was mainly the result of experimental convenience and limited funding, and the study's results would be more reliable without this sampling bias.

Additionally, the present study utilized a beverage sample that did not consist of real products currently available in stores. This might another limitation, due to differences in flavor and form. However, this study attempted to design and produce its beverage sample with several pre-tests and with the help of professional consultants so that its sample was similar to real products. Future research should examine the same effects by using real products, thereby improving the generalizability of this study's findings.

As mentioned before as well, this study examined the effects of color and edible pigment by using an experimental approach; therefore, this study's results are limited in their generalizability because they do not speak to external validity. Still, using an experimental design to control for other factors that might influence the relationships between independent variables (such as labeling, packaging, and pricing) and consumer evaluations is helpful in establishing the internal validity of the present findings. Moreover, the effects of color and food additives should be extended to other food categories. This study only focused on beverages to control for other factors.

This research is also limited in that it considers only a direct-drinking scenario. There are various methods of drinking a beverage, such as pouring the beverage into a cup or drinking it through a straw. Different outcomes might occur when considering these other means of drinking. Too, this study considers only a small beverage size (500 ml), which consumers can drink without needing to pour the beverage into another container. Different results are expected when the consumer is able to see the beverage's color firsthand because of larger containers and other pouring scenarios.

Lastly, this study is limited in that consumer evaluations for the test beverage containing red edible pigment were low compared with the study's initial expectations. Although there was a tendency to evaluate the red beverage in a transparent bottle more favorably than the transparent beverage in a transparent bottle, there was no statistical significance

between the two conditions. This result might have occurred because of unfamiliarity with the experiment's beverage sample; participants might have concentrated on the novel color of the beverage sample, and this might have affected their product evaluations.

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Appendix A. IRB Documents

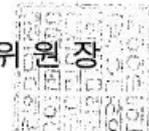
SIF 16-004

심의결과 통보서

수신	책임연구자	성명	조종표	소속	농경제사회학부	직위	학생
	지원기관						
승인 번호	IRB No.1411/001-023						
연구과제명	음료와 포장의 색깔과 소비자의 선호에 관한 연구						
연구종류	<input checked="" type="checkbox"/> 설문조사 <input checked="" type="checkbox"/> 관찰연구 <input type="checkbox"/> 행동실험연구 <input type="checkbox"/> 조직 및 검체 연구(혈액, 체액 등) <input type="checkbox"/> 배아연구 <input type="checkbox"/> 체세포복제 배아연구 <input type="checkbox"/> 유전자연구 <input type="checkbox"/> 유전자치료연구 <input type="checkbox"/> 보관된 검체 연구 <input type="checkbox"/> 임상시험 <input type="checkbox"/> 기타 ()						
심의종류	<input type="checkbox"/> 정규심의 <input checked="" type="checkbox"/> 신속심의 <input type="checkbox"/> 긴급심의						
심의일자	2014 년 11 월 10 일						
심의대상	<input type="checkbox"/> 연구계획서(신규)			<input checked="" type="checkbox"/> 책임연구자			
	<input checked="" type="checkbox"/> 연구계획서(보완)			<input checked="" type="checkbox"/> 연구참여자 동의서			
	<input type="checkbox"/> 계획서 변경			<input checked="" type="checkbox"/> 증례기록서			
	<input type="checkbox"/> 중간보고서			<input checked="" type="checkbox"/> 연구참여자 모집 광고			
	<input type="checkbox"/> 중지 또는 조기종료보고서			<input type="checkbox"/> 연구참여자 작성 일지			
	<input type="checkbox"/> 종료보고서			<input checked="" type="checkbox"/> 기타 연구참여자에게 제공되는 문서			
	<input type="checkbox"/> 승인된 연구계획서의 1년 단위 지속심의			<input checked="" type="checkbox"/> 기타(심의의견에 대한 답변서)			
심의결과	승인						
승인일자	2014 년 11 월 10 일		승인유효기간	2015 년 11 월 9 일 까지			
정기보고주기	<input type="checkbox"/> 3개월 <input type="checkbox"/> 6개월 <input checked="" type="checkbox"/> 1년 <input type="checkbox"/> 기타 () ♦ 정기보고주기는 1년을 초과할 수 없음						
심의의견	1. 심의결과 제출하신 연구계획에 대해 승인하며, 개인정보보호에 유의하여 주시기 바랍니다. 2. 연구자께서는 승인된 문서를 사용하여 연구를 진행하시기 바라며, 만일 연구진행 과정에서 계획상에 변경사항(연구자 변경, 연구내용 변경 등)이 발생할 경우 본 위원회에 변경신청을 하여 승인 받은 후 연구를 진행하여 주십시오. 3. 유효기간 내 연구가 끝났을 경우 <u>종료 보고서</u> 를 제출하여야 하며, 승인유효기간 이후에도 연구를 계속하고자 할 경우, <u>2015년 10월까지</u> 지속심의를 받도록 하여 주십시오.						

2014 년 11 월 10 일

서울대학교 생명윤리심의위원회 위원장



본 위원회가 승인한 연구를 수행하는 연구자들은 다음의 사항을 준수해야 합니다.

1. 반드시 계획서에 따라 연구를 수행해야 합니다.
2. 위원회의 승인을 받은 연구참여자 동의서를 사용해야 합니다.
3. 모국어가 한국어가 아닌 연구참여자에게는 승인된 동의서를 연구참여자의 모국어로 번역하여 사용해야 하며 번역본은 인증 및 위원회의 승인을 거쳐야 합니다.
4. 연구참여자 보호를 위해 불가피한 경우를 제외하고는 연구 진행중의 변경에 대해서는 위원회의 사전 승인을 받아야 합니다. 연구참여자의 보호를 위해 취해진 응급상황에서의 변경에 대해서는 즉각 위원회에 보고해야 합니다.
5. 위원회에서 승인 받은 계획서에 따라 등록된 연구참여자의 사망, 입원, 심각한 질병에 대하여는 위원회에 서면으로 보고해야 합니다.
6. 임상시험 또는 연구참여자의 안전에 대해 유해한 영향을 미칠 수 있는 새로운 정보는 즉각 위원회에 보고해야 합니다.
7. 위원회의 요구가 있을 때에는 연구의 진행과 관련된 사항에 관하여 위원회에 보고해야 합니다.
8. 연구참여자 모집광고는 사용 전에 위원회로부터 승인을 받아야 합니다.
9. 강제 혹은 부당한 영향력이 없는 상태에서 충분한 설명에 근거하여 연구참여자로부터 동의를 받아야 하며, 잠재적인 연구참여자에 대해서 연구 참여 여부를 숙려할 수 있도록 충분한 기회를 제공해야 합니다.

연구참여자용 설명서 및 동의서

연구 과제명 : 음료의 신제품 개발을 위한 음료 선호에 관한 연구

연구 책임자명 : 조종표 (서울대학교 농업생명과학대학 Food Business Lab. 연구원)

이 연구는 음료 신제품 개발을 위해 신제품 출시 예정 음료들 이용해서 진행되는 소비자 시장 테스트입니다. 귀하는 음료를 평소 사 먹는 소비자로서 이 연구에 참여하도록 권유 받았습니다. 건강상의 이유로 평소 음료를 마시지 않는 소비자의 경우 본 연구의 대상이 아님을 명심해 주시기 바랍니다. 이 연구를 수행하는 서울대학교 푸드비즈니스 연구실의 연구원 조종표()가 귀하에게 이 연구에 대해 설명해 준 것입니다. 이 연구는 자발적으로 참여 의사를 밝히신 분에 한하여 수행 될 것이며, 귀하께서는 참여 의사를 결정하기 전에 본 연구가 왜 수행되는지 그리고 연구의 내용이 무엇과 관련 있는지 이해하는 것이 중요합니다. 다음 내용을 신중히 읽어보신 후 참여 의사를 밝혀 주시기 바랍니다. 필요하다면 가족이나 친구들과 의논해 보십시오. 만일 어떠한 질문이 있다면 담당 연구원이 자세하게 설명해 줄 것입니다.

1. 이 연구는 왜 실시합니까?

이 연구의 목적은 새로운 음료의 개발을 위한 소비자 반응을 분석하기 위한 연구입니다.

2. 얼마나 많은 사람이 참여합니까?

약 400명의 명의 사람이 참여 할 것입니다.

3. 만일 연구에 참여하면 어떤 과정이 진행됩니까?

연구는 실험장소에서 개별 당 세팅된 각자의 부스에서 일정량의 음료(약 100ml)를 음용한 뒤 만족도를 조사하는 형식입니다. 실험 후 간단한 설문에 응답하도록 설문지가 배부될 예정입니다. 설문조사는 귀하의 만족도와 생각에 대한 전반적인 질문들이 포함 됩니다. 실험 소요 시간은 15-20분 정도 소요될 것입니다.

4. 연구 참여 기간은 얼마나 됩니까?

시간은 약 15-20분 정도 소요될 것입니다.

5. 참여 도중 그만두어도 됩니까?

예, 귀하는 언제든지 어떠한 불이익 없이 참여 도중에 그만 둘 수 있습니다. 만일 귀하가 연구에 참여하는 것을 그만두고 싶다면 담당 연구원이나 연구 책임자에게 즉시 말씀해 주십시오.

6. 부작용이나 위험요소는 있습니까?

본 연구는 아무런 신체적/정신적 부작용을 야기하지 않습니다. 본 연구에서 사용되는 음료는 식품제조 전문가의 자문을 통해 제작되었으며, 허용된 식품 및 식품첨가물을 사용하여 제조된 음료입니다. 하지만 실험 중 신체에 이상이 발생하는 경우 협조된 병원과의 긴밀한 협조를 통해 응급조치가 취해질 것이며, 본 연구는 식약처 가이드라인에 따른 피해보상 규정을 준수합니다.



7. 이 연구에 참여시 참여자에게 이득이 있습니까?

귀하가 이 연구에 참여하는데 있어서 직접적인 이득은 없습니다. 그러나 귀하가 제공하는 정보는 더 건강하고 안전한 음료를 개발하고, 음료와 관련된 소비자 행동에 대한 이해를 증진하는데 도움이 될 것입니다.

8. 만일 이 연구에 참여하지 않는다면 불이익이 있습니까?

귀하는 본 연구에 참여하지 않을 자유가 있습니다. 또한, 귀하가 본 연구에 참여하지 않아도 귀하에게는 어떠한 불이익도 없습니다.

9. 연구에서 얻은 모든 개인 정보의 비밀은 보장됩니까?

개인정보관리책임자는 서울대학교의 조종표 연구원(010-4180-3617, 02-880-4746)입니다. 저희는 이 연구를 통해 얻은 모든 개인 정보의 비밀 보장을 위해 최선을 다할 것입니다. 이 연구에서 얻어진 개인 정보가 학회지나 학회에 공개 될 때 귀하의 이름과 다른 개인 정보는 사용되지 않을 것입니다. 그러나 만일 법이 요구하면 귀하의 개인정보는 제공될 수도 있습니다. 또한 모니터 요원, 점검 요원, 생명윤리심의위원회는 연구참여자의 개인 정보에 대한 비밀 보장을 침해하지 않고 관련규정이 정하는 범위 안에서 본 연구의 실시 절차와 자료의 신뢰성을 검증하기 위해 연구 결과를 직접 열람할 수 있습니다. 귀하가 본 동의서에 서명하는 것은, 이러한 사항에 대하여 사전에 알고 있었으며 이를 허용한다는 동의로 간주될 것입니다.

10. 이 연구에 참가하면 댓가가 지급됩니까?

귀하의 연구 참여시 교통비등의 실비로 귀하에게 3,000원이나 이에 해당하는 식권이 지급될 것입니다.

11. 연구에 대한 문의는 어떻게 해야 됩니까?

본 연구에 대해 질문이 있거나 연구 중간에 문제가 생길 시 다음 연구 담당자에게 연락하십시오.

이름: 조 종표

전화번호: 02-880-4746

만일 어느 때라도 연구참여자로써 귀하의 권리에 대한 질문이 있다면 다음의 서울대학교 생명윤리심의위원회에 연락하십시오.

서울대학교 생명윤리심의위원회 (SNUIRB)

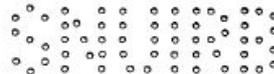
전화번호: 02-880-5153



동 의 서

1. 나는 이 설명서를 읽었으며 담당 연구원과 이에 대하여 의논하였습니다.
2. 나는 위험과 이득에 관하여 들었으며 나의 질문에 만족할 만한 답변을 얻었습니다.
3. 나는 이 연구에 참여하는 것에 대하여 자발적으로 동의합니다.
4. 나는 이 연구에서 얻어진 나에 대한 정보를 현행 법률과 생명윤리심의위원회 규정이 허용하는 범위 내에서 연구자가 수집하고 처리하는데 동의합니다.
5. 나는 담당 연구자나 위임 받은 대리인이 연구를 진행하거나 결과 관리를 하는 경우와 보건 당국, 학교 당국 및 서울대학교 생명윤리심의위원회가 실태 조사를 하는 경우에는 비밀로 유지되는 나의 개인 신상 정보를 직접적으로 열람하는 것에 동의합니다.
6. 나는 언제라도 이 연구의 참여를 철회할 수 있고 이러한 결정이 나에게 어떠한 해도 되지 않을 것이라는 것을 압니다.
7. 나의 서명은 이 동의서의 사본을 받았다는 것을 뜻하며 연구 참여가 끝날 때까지 사본을 보관하겠습니다.

연구참여자 성명	서 명	날짜 (년/월/일)
연구책임자 성명	서 명	날짜 (년/월/일)



Appendix B. Recruitment Document

IRB No. 1411/001-023

유효기간: 2015년 11월 9일

마케팅 설문 등록

서울대학교 농업생명과학대학 Food Business Lab.

서울대학교 농업생명과학대학 푸드비즈니스 연구실에서 11월 ~일(월)부터 11월 ~까지 5일에 걸쳐 실험과 설문을 진행하고 있습니다. 새롭게 출시되는 음료를 마시고 설문조사에 참여하는 데 관심있는 분들의 많은 참여 부탁드립니다.

날짜: 11월 ~일, ~ 일

* 참가 자격: 실험시간(약 15분)동안 음료수 100~150ml를 마시고 설문조사를 응답할 수 있는 참가자, 평소 건강상의 이유로 음료수를 사 먹지 않는 분은 본 연구의 연구 대상에서 벗어납니다.

* 설문의 성격 상 외국인 학생은 이번 실험에 참가하실 수 없습니다.

장소: 203동 201호

소요시간: 약 15분

사례비: 3,000원 또는 식권

신청방법: 아래 날짜, 시간대 표를 보고 원하시는 빈 시간대의 "등록"버튼을 눌러 연락처를 남겨주시고 신청하신 시간대에 오시면 됩니다.

실험 신청이 완료된 개인에게 확인 문자가 배부될 예정입니다.

날짜/장소 시간	11월 X일	11월 X일	11월 X일
16:00	명 <input type="checkbox"/> 등록	명 <input type="checkbox"/> 등록	명 <input type="checkbox"/> 등록
-	가능	가능	가능
16:50			
17:00	명 <input type="checkbox"/> 등록	명 <input type="checkbox"/> 등록	명 <input type="checkbox"/> 등록
-	가능	가능	가능
17:50			
18:00	명 <input type="checkbox"/> 등록	명 <input type="checkbox"/> 등록	명 <input type="checkbox"/> 등록
-	가능	가능	가능
18:50			
19:00	명 <input type="checkbox"/> 등록	명 <input type="checkbox"/> 등록	명 <input type="checkbox"/> 등록
-	가능	가능	가능
19:50			



Appendix C. Manipulation Material (Hedonic)

IRB No. 1411/001-023

유효기간: 2015년 11월 9일

 **CAL S** 서울대학교 농업생명과학대학
College of Agriculture and Life Sciences

식별 번호: 1-__

본 연구는 보다 좋은 질의 제품의 생산을 통해 소비자를 만족시킬 수 있는 새로운 음료 개발을 위한 소비자 반응을 살펴보기 위한 목적으로 진행되는 것입니다.

다음의 신제품 설명과, 음용 방법을 꼼꼼하게 읽고 따라주시기 바랍니다.
밀줄을 치거나 작게 소리 내며 읽어 본 제품에 대해 꼼꼼하게 읽으셔야 합니다.

먼저 <음료 신제품 개발을 위한 소비자 반응 조사 연구>에 참여해주셔서 감사합니다.

오늘 귀하가 참여하게 될 실험은 '한국식음료산업연구원'과 '서울대학교 농업생명과학대학'의 공동연구로 진행되는 실험이며, 공동연구의 목적은 신제품 개발 및 출시단계에서 소비자 반응을 테스트 하는 것입니다.

귀하가 오늘 음용할 제품은 과일음료 신제품 중 하나이며, 다음은 본 제품의 특징입니다.

<신제품의 특징>

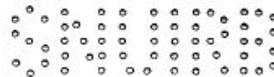
본 제품은 기존의 청량음료들과 '음료의 맛' 측면에서 차별화를 두었습니다. 진짜 과일에서 추출한 과당을 첨가하여 달콤한 맛을 강조하고, 또한 자극적이지 않은 탄산감을 가미하여 달콤함 뿐만 아니라 상큼함을 강조하는 효과가 있습니다. 또한 갈증해소를 위한 최적의 레시피로 만들어진 청량음료입니다.

일반적인 과일 음료와는 달리 보다 더 감각적인 맛을 강조하고, 자연을 머금은 과일에서 실제로 추출한 결정과당을 사용하여 맛을 강화하고, 달콤함이 입 안에 가득히 느껴지고 일상을 벗어난 자연의 느낌을 주기 위하여 만든 소비자에게 즐거움을 전달하기 위한 청량음료입니다.

<음용 방법>

음용 방법은 다음과 같습니다.

귀하는 신제품 음료 샘플을 약 200ml 제공받게 되며, 원하는 만큼 음용한 뒤, 마개를 닫아 주십시오.



Appendix C. Manipulation Material (Utilitarian)

IRB No. 1411/001-023

유효기간: 2015년 11월 9일

 **CAL S** 서울대학교 농업생명과학대학
College of Agriculture and Life Sciences

식별 번호: 2-__

본 연구는 보다 좋은 질의 제품의 생산을 통해 소비자를 만족시킬 수 있는 새로운 음료 개발을 위한 소비자 반응을 살펴보기 위한 목적으로 진행되는 것입니다.

다음의 신제품 설명과, 음용 방법을 꼼꼼하게 읽고 따라주시기 바랍니다.
밀줄을 치거나 작게 소리 내며 읽어 본 제품에 대해 꼼꼼하게 읽으셔야 합니다.

먼저 <음료 신제품 개발을 위한 소비자 반응 조사 연구>에 참여해주셔서 감사합니다.

오늘 귀하가 참여하게 될 실험은 '한국식음료산업연구원'과 '서울대학교 농업생명과학대학'의 공동연구로 진행되는 실험이며, 공동연구의 목적은 신제품 개발 및 출시단계에서 소비자 반응을 테스트 하는 것입니다.

귀하가 오늘 음용할 제품은 과일음료 신제품 중 하나이며, 다음은 본 제품의 특징입니다.

<신제품의 특징>

본 제품은 기존의 건강음료들과 '영양적인' 측면에서 차별화를 두었습니다. 각종 비타민을 1,000mg 포함하여 비타민 섭취를 강화하고, 골다공증과 당뇨에 도움이 되는 칼슘, 우리 몸에 꼭 필요한 70여 종의 미네랄을 첨가하였습니다. 또한 빈혈, 만성피로에 도움이 되는 엽산을 함유하고 있는 건강기능음료입니다.

일반적인 과일 음료와는 달리 고품질 비타민, 미네랄, 칼슘, 엽산을 함유하고, 일반 설탕의 1/3 수준의 GI 지수를 가지는 결정과당을 사용하여 혈당치가 서서히 올라가기 때문에 비만이나 당뇨환자도 부담 없이 먹을 수 있도록 만든 소비자의 건강을 위한 건강기능음료입니다.

<음용 방법>

음용 방법은 다음과 같습니다.

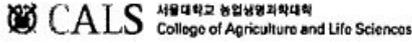
귀하는 신제품 음료 샘플을 약 200ml 제공받게 되며, 원하는 만큼 음용한 뒤, 마개를 닫아 주십시오.



Appendix D. Survey

IRB No. 1411/001-023

유효기간: 2015년 11월 9일



1) 귀하가 음용한 음료에 대한 선호도 평가를 해 주십시오

	전혀 그렇지 않다	그렇지 않다	보통이다	그렇다	매우 그렇다
나는 이 음료에 호감이 간다.	1	2	3	4	5
나는 이 음료가 좋다.	1	2	3	4	5
나는 이 음료가 마음에 든다.	1	2	3	4	5

2) 귀하가 음용한 음료가 얼마나 실용적(유용하고, 실질적이고, 기능적) 혹은 얼마나 쾌락적(즐겁고, 재미있고, 감각적)이라고 생각하십니까?

실용적 ←				→ 쾌락적		
매우 실용적	실용적	조금 실용적	보통	조금 쾌락적	쾌락적	매우 쾌락적
1	2	3	4	5	6	7

3) 다음은 귀하가 음용한 음료에 대한 만족도를 묻는 질문입니다.

3-1) 섭취한 음료의 모든 면을 고려했을 때, 귀하는 전반적으로 얼마나 만족하십니까?

매우 불만족	불만족	보통	만족	매우 만족
1	2	3	4	5

3-2) 섭취한 음료는 당신의 기대를 어느 정도 충족하였습니까?

기대보다 훨씬 못함	기대보다 못함	비슷함	기대보다 좋음	기대보다 훨씬 좋음
1	2	3	4	5

3-3) 먼저 모든 면에서 완벽한 음료를 떠올려 봅시다. 섭취한 음료는 완벽한 음료에 얼마나 가깝습니까?

매우 멀다	멀다	보통이다	가깝다	매우 가깝다
1	2	3	4	5

4) 다음의 식품에 대한 품질과 관련된 속성에 대해 자신의 생각을 표기해 주십시오.

	전혀 그렇지 않다	그렇지 않다	보통이다	그렇다	매우 그렇다
1 나는 보존료가 없는 천연식품을 사는 것을 좋아한다.	1	2	3	4	5
2 나에게 식품의 가공하지 않은 자연스러움은 중요한 요인이다.	1	2	3	4	5
3 나는 첨가물이 들어간 식품을 먹는 것은 피하고 싶다	1	2	3	4	5

5) 다음은 귀하가 음용한 음료에 대한 구매의도를 묻는 질문입니다.

	매우 낮다	낮다	보통이다	높다	매우 높다
1 내가 이 음료를 구매할 가능성은 _____ .	1	2	3	4	5
2 내가 이 음료를 사려고 생각해 볼 확률은 _____ .	1	2	3	4	5
3 이 음료를 기꺼이 살 의향이 _____ .	1	2	3	4	5



6) 다음은 자신의 건강에 대한 귀하의 생각을 묻는 질문입니다.

(현재 건강인식) 현재 자신의 건강 상태가 어떻다고 생각하십니까?

매우 나쁘다	비교적 나쁘다	보통이다	비교적 좋다	매우 좋다
1	2	3	4	5

(과거비교 건강인식) 과거(예전)와 비교했을 때, 귀하의 현재의 건강상태는 어떻다고 생각하십니까?

매우 나쁘다	비교적 나쁘다	보통이다	비교적 좋다	매우 좋다
1	2	3	4	5

(포레비교 건강인식) 당신의 포레와 비교했을 때, 귀하의 현재의 건강상태는 어떻다고 생각하십니까?

매우 나쁘다	비교적 나쁘다	보통이다	비교적 좋다	매우 좋다
1	2	3	4	5

7) 다음의 건강과 관련된 속성에 대해 자신의 생각을 표기해 주십시오.

	전혀 그렇지 않다	그렇지 않다	보통이다	그렇다	매우 그렇다
1 나는 나의 건강을 매우 신중하게 생각한다.	1	2	3	4	5
2 나는 나의 건강에 대해 매우 자의식이 강하다.	1	2	3	4	5
3 나는 나의 건강의 변화에 민감하다.	1	2	3	4	5
4 나는 보통 나의 건강에 대해 알고 있다.	1	2	3	4	5
5 나는 나의 건강 상태에 대해 책임을 진다.	1	2	3	4	5
6 나는 하루를 보내면서 나의 건강 상태에 대해 알고 있다.	1	2	3	4	5

8) 귀하가 음용하신 음료와 유사한 성격의 음료 500ml의 경우 현재 마트나 편의점에서 1,500원 정도에 판매되고 있습니다. 만약 본 제품이 500ml 음료로 시장에 출시된다면 귀하는 얼마 정도에 판매하면 적당하다고 생각하십니까?

_____ 원

9) 자신의 전반적인 건강을 (1~10)점으로 나타낼 수 있다면 몇 점을 주시겠습니까?

_____ 점



〈신제품 개발 관련 설문(공통)〉

식별 번호: _____

다음은 신제품 시장 테스트를 위한 공통 조사입니다.
귀하의 의견은 다음 신제품 개발 연구에 도움이 됩니다.

- 1) 이번에 귀하가 응용하신 음료는 무슨 과일의 맛(향) 음료입니까? _____
- 2) 다음 중 신제품 개발 시 소비자의 선호가 가장 높을 것 같은 음료는 어떤 음료입니까?
① 사과맛 ② 오렌지맛 ③ 복숭아맛 ④ 포도맛 ⑤ 딸기맛 ⑥기타()
- 3) 이번에 귀하가 응용하신 음료의 내용물은 무슨 색깔입니까? _____
- 4) 다음 중 신제품 개발 시 소비자의 선호가 가장 높을 것 같은 음료의 색은 어떤 색깔입니까?
① 노란색 ② 주황색 ③ 분홍색 ④ 보라색 ⑤ 빨간색 ⑥기타()
- 5) 귀하가 응용하신 음료에 가장 어울리는 포장 형태는 어떤 것이라고 생각하십니까?
① 종이팩 ② 캔 ③ 유리병 ④ 플라스틱 병 ⑤ 기타()
- 6) 다음은 귀하의 생각에 대한 질문입니다.

	전혀 그렇지 않다	그렇지 않다	보통이다	그렇다	매우 그렇다
1 나는 색소가 함유된 음료는 건강에 좋지 않다고 생각한다.	1	2	3	4	5
2 내가 마신 음료의 당도는 적절하다.	1	2	3	4	5
3 내가 마신 음료의 산미는 적절하다	1	2	3	4	5
4 나는 건강을 위해 비타민 등의 건강보조식품을 먹는다.	1	2	3	4	5

- 7) 마지막 질문입니다. 귀하가 참여하신 이번 실험의 목적은 무엇이었습니까?

연구에 참여해 주셔서 감사합니다.



실험 종료 후 디브리핑문

(실험이 종료 된 후)

“오늘 여러분들이 참여해주신 실험은 음료와 병의 색깔이 소비자 행동에 미치는 영향에 대한 연구로 저의 졸업논문 주제입니다.

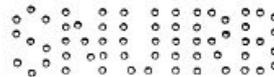
본 연구의 대상은 음료수를 평소에 사 먹는 소비자들로, 평소에 건강이나 기타 이유로 음료수를 사 먹지 않는 소비자들은 오늘 연구의 대상에서 벗어납니다.

오늘 음용하신 음료는 물, 레모네이드를 바탕으로 결정과당, 식용색소, 합성착향료와 같은 식품첨가물을 이용해 제조된 것이며, 식품첨가물 전문가의 자문을 받아 안전하게 만들어진 음료입니다.

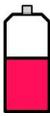
여러분들은 음료의 색과 음료병의 색, 그리고 쾌락적/실용적 제품에 대한 상황 조작을 각기 달리한 8가지 조건 중 하나에 무작위로 배정되어 실험에 참가하였습니다.

궁금한 점이 있다면 편하게 물어봐주시면 감사하겠습니다. 다만, 아직 종료된 실험이 아니므로, 오늘 실험의 정확한 내용에 대해서 주위 사람들에게 알리는 것은 삼가주시면 감사하겠습니다.

오늘 실험에 참여해주셔서 정말로 감사합니다.”



Appendix E. Experimental Tools



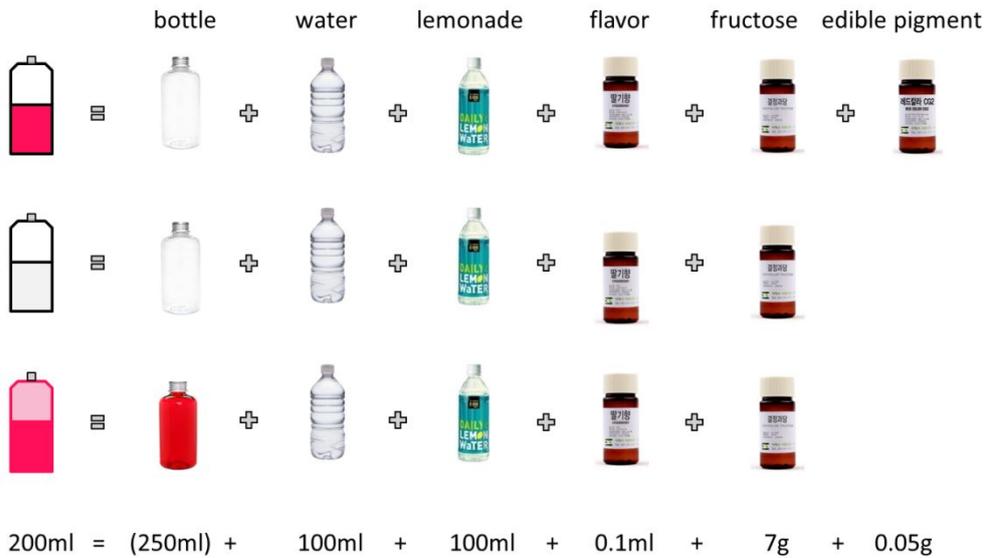
Red beverage
Transparent bottle
(Group 1)




Transparent beverage
Red bottle
(Group 2)




Transparent beverage
Transparent bottle
(Group 3)



Appendix F. Correlations

<All groups>

	(1)	(2)	(3)	(4)	(5)	(6)
(1) Age	1					
(2) Gender	-.079	1				
(3) Satisfaction	-.085	-.135*	1			
(4) Willingness to buy	-.097	-.104	.787**	1		
(5) Attitude toward food additives	.210**	.238**	.142*	.199**	1	
(6) Perceived health status	-.134*	-.059	.057	.014	.058	1

* p < 0.05, ** p < 0.01

<Hedonic group>

	(1)	(2)	(3)	(4)	(5)	(6)
(1) Age	1					
(2) Gender	-.130	1				
(3) Satisfaction	-.021	-.073	1			
(4) Willingness to buy	-.074	-.160	.764**	1		
(5) Attitude toward food additives	.208*	.161	.142	.157	1	
(6) Perceived health status	-.110	.070	.120	.055	.246**	1

* p < 0.05, ** p < 0.01

<Utilitarian group>

	(1)	(2)	(3)	(4)	(5)	(6)
(1) Age	1					
(2) Gender	-.031	1				
(3) Satisfaction	-.096	-.187*	1			
(4) Willingness to buy	-.073	-.034	.802**	1		
(5) Attitude toward food additives	.204*	.311**	.183*	.267**	1	
(6) Perceived health status	-.206*	-.187*	.020	-.008	-.123	1

* p < 0.05, ** p < 0.01

<Red beverage in transparent bottle group>

	(1)	(2)	(3)	(4)	(5)	(6)
(1) Age	1					
(2) Gender	-.007	1				
(3) Satisfaction	.052	-.096	1			
(4) Willingness to buy	.045	-.050	.736**	1		
(5) Attitude toward food additives	.246*	.364**	.125	.201	1	
(6) Perceived health status	-.121	-.071	.244*	.190	.141	1

* p < 0.05, ** p < 0.01

<Transparent beverage in red bottle group>

	(1)	(2)	(3)	(4)	(5)	(6)
(1) Age	1					
(2) Gender	-.149	1				
(3) Satisfaction	-.201	-.075	1			
(4) Willingness to buy	-.144	-.099	.859**	1		
(5) Attitude toward food additives	.209*	.206	.258*	.290**	1	
(6) Perceived health status	-.182	-.063	.062	.005	.061	1

* p < 0.05, ** p < 0.01

<Transparent beverage in transparent bottle group>

	(1)	(2)	(3)	(4)	(5)	(6)
(1) Age	1					
(2) Gender	-.075	1				
(3) Satisfaction	-.067	-.221*	1			
(4) Willingness to buy	-.197	-.148	.750**	1		
(5) Attitude toward food additives	.175	.145	.060	.123	1	
(6) Perceived health status	-.134	-.056	-.037	-.091	-.016	1

* p < 0.05, ** p < 0.01

요약 (국문초록)

음료 제품 평가에 미치는 색의 영향

The Effect of Color on Beverage Product Evaluation

소비자의 식품 선택에는 다양한 요인들이 영향을 미치고 있다. 이러한 요인들 중 색깔은 소비자에게 맛에 대한 기대를 형성하고, 동시에 제품에 대한 인식을 돕는 역할을 한다. 본 연구는 음료의 색깔과 병의 색깔이 만족도와 구매의사와 같은 음료에 대한 소비자 행동에 미치는 영향에 대해 분석하고자 한다. 또한, 음료의 성격, 건강과 관련된 개인의 인식, 식품첨가물에 대한 태도를 조절변수로 사용하여 색깔과 식품첨가물의 영향을 심층적으로 분석하고자 한다. 본 연구는 이러한 목적을 달성하기 위해, 딸기 맛 음료를 개발하여 음료의 색과 음료의 병에 색에 따른 조건에 따라 300 명의 참가자를 대상으로 실험을 진행하였다. 그 결과, 투명한 음료가 빨간 병에 들어 있는 경우 맛에 대한 적절한 기대를 형성하여 만족도와 구매의도가 가장 높게 나타났다. 또한 각 조건에서 서로 다른 조절변수가 유의한 영향을 보였다.

주요어: 기대 불일치 이론 (Expectancy Disconfirmation Theory), 동화-대조 효과 (Assimilation-Contrast Effect), 기대 (Expectation), 음료 색깔 (Beverage Color), 식품 첨가물 (Food additives), 만족도 (Satisfaction)

학번: 2013-21122