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Food as Experience

A Design and Evaluation Methodology

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Abstract

This research, conducted for Frito Lay-North America, Inc, demonstrates how new product designs, package designs, concepts, and prototypes can be created based on the social, emotional, cognitive, and sensory information gathered through a combined methodology based on activity theory, *Kansei* Engineering and the ZMET process. The study examines how activity theory can be used to observe situational settings mediated by products for the purpose of collecting significant social and behavioral data. It also examines how *Kansei* methods can be used to evaluate sensory experiences and how the ZMET process can be used to gather demographic and marketing data. The outcome of this research concludes that activity theory, *Kansei* engineering, and ZMET are each useful, however, none of these methods used in isolation are sufficient to inform all aspects of marketing, new product development, and package design decisions. However, as a combined design and evaluation methodology they can provide more useful data for these processes.

Keywords

Experience Design, *Kansei* Assessment, Food, Activity Theory

This research uses the marketing and audience analysis data from the Tostitos'® ZMET study (<http://www.olsonzaltman.com>). The Zaltman Metaphor Elicitation Technique (ZMET®) is a marketing tool that uses picture associations to probe the motivations underlying a person's decision to buy a product or form an opinion. The information produced by the ZMET process emphasises market behaviors and desires, while *Kansei* information emphasises the sensory and emotional needs of the target audience. Alone, neither process is sufficient to make the best design and marketing decisions for a product line. The paper argues that designers can combine information gained from the ZMET process with activity theory and *Kansei* information to design products that are both physically and emotionally appealing to the target audience, and appropriately marketed to match their shopping and social snacking behaviors. It is our assertion that these three strategies form an ideal complimentary process to design and market products in the most advantageous ways for both the target audience and for manufacturers.

Prior to this research, a ZMET study was conducted by Tostitos®. The ZMET process produced a large quantity of visual and verbal information generated by members of the target audience. The responses were coded with only very basic

demographic information about gender and a general association to a sub-group of the target audience. The data produced by the ZMET process consisted of a written paragraph of text and a visual collage created by the respondent with the assistance of a graphic designer. The written analysis gave the title of the collage, a written analysis of the meaning of each image in their collage and a description of why it represented some aspect of Tostitos®.

From the standpoint of a designer, a ZMET study contains a lot of information about how the target audience thinks about the product, the emotions they associate with the product, and the social situations in which they use the product. This information is very useful when making marketing decisions or even possibly branding decisions. However, one thing the ZMET study does not provide is information about aspects of the product that are associated with the usability of the product in terms of its physical, tactile, and sensory properties. In addition, it does not provide the type of information that would allow a company to design new products or packages based on user reactions to the product that are related to the senses of touch, sound, smell, or sight, as well as the activity or social contexts that surround the product. For this reason, the information gathered through the ZMET process was combined with information derived from a study that was based on the principles of Kansei engineering, product usability, and activity theory. This hybrid process takes into account the attitudes and demographics of the target audience, as well as their emotional responses, social attitudes, and product usability responses.

“Kansei engineering was founded by Mitsuo Nagamachi at Hiroshima University about 30 years ago and it is a powerful ergonomic consumer-oriented technology for a new product development” (Nagamachi, 1999). According to Nagamachi, *Kansei* engineering is “to seek the structure of emotions which exist beneath human behaviors. This structure is referred to as a person’s *Kansei*.” It focuses on how people respond emotionally to products, packages, and brand experiences. It addresses the question of why people like a product, package, or brand in terms of its sensory and tactile properties. This research focused on the dual approach of incorporating cognitive data and *Kansei* data in the development of new design concepts and methodologies for the Tostitos® Brand line.

In order to give the data a connection to the actual situations where Tostitos® products are used, activity theory was used as a model. In this case, the Tostitos product took on the role of the mediating tool as defined by Engestrom’s Activity Analysis. According to Gay and Hembrooke, there is a critical role played by cultural artifacts or tools in terms of their transformative power over a situation (Gay and Hembrooke, 2004, pp. 4-5). In the case of this study, the Tostitos products are this transformative artifact and to evaluate them outside of this context is to miss much of the critical social and usability information that will be pertinent to the design of new products or packages.

Methods Used

To measure emotion using the *Kansei* engineering process, the following four methods are commonly used (Schütte, 2005, p45): People’s behaviors and actions, Words (spoken), Facial and body expressions, and Physiological responses (e. g. Heart Rate, EMG, EEG).

For our evaluation, the first two criteria: people’s behaviors and actions and

spoken words, were used as the basis for creating the Tostitos® Brand *Kansei* evaluation method. People's behaviors and actions were observed and video taped during several focus groups, as well as recording their spoken responses to a set of questions about the emotional, physical, and sensory properties of the products and packages. These responses were used to distill words and phrases that became part of the *Kansei* word lists. These word lists were later distilled to create a Likert evaluation matrix for the chips, and packages. A series of 5 focus groups were conducted to get spontaneous responses and words for the *Kansei* method. The focus group participants represented a variety of consumer groups, ages, gender, and cultural backgrounds. See Figure 1.



Figure 1. Focus group evaluating chips, dip, and packaging.

Based on activity theory, groups of 4-5 people were formed to reflect a variety of social situations similar to the context of social snacking described in the ZMET study. The groups included one in a work place, one outdoors, two in private homes, and one in a college setting. Data was collected from two video cameras, one with a complete view of the scene and another focused on the chips and dip on the table.

The focus groups were selected to provide variety in the types of social and emotional relationships among the members of the group. Because Tostitos® focuses on the group snacking environment, it was considered important to form the types of groups and settings that would be indicative of the Tostitos® consumer as determined by the ZMET study. For our research we selected one person as an initiator of each group. The people selected for this initiator role were asked to form groups around one of the Tostitos® group snacking situations. The focus groups represented a group of co-workers in a work environment, a family in a home environment, a group of friends in an outdoor environment, and a group of couples in a common social setting. The initiator for each group was then instructed to select 2-4 additional people to participate in the focus group. It was important for the groups and exact settings to be selected by this person in order to reflect as closely as possible the actual social settings that would be indicative of a Tostitos® snacking

situation.

It was considered very important to preserve the social and emotional quality of the focus groups. Participants were encouraged to be casual and comfortable with the setting and with each other. In order to preserve these social and emotional feelings, the groups convened in the setting and were then given approximately 10 minutes to freely talk with each other, as well as to serve and eat the chips and dip. While this initial phase was taped for analysis, the facilitators were instructed to be absent from this initial 10-minute period in order to allow the group to relax and share a social and emotional experience without close scrutiny.

After this initial unstructured period, the facilitators returned and lead a guided discussion based on a series of *Kansei* questions. The questions were designed to focus on the physical senses of sight, sound, touch (proprioceptive and kinesthetic), and smell. The sense of taste was excluded based on the fact that Tostitos® has extensive research on the taste of its products. The questions also included perceptual sensory experiences and emotional experiences. The questions were designed to elicit descriptive responses from the participants. They were also designed to encourage metaphoric descriptions and responses.

During the discussion period, focus group participants were allowed to answer questions in an informal manner. They were not required to give answers and were allowed to freely exchange ideas and responses with other group members and the facilitator. They were allowed to continue eating the chips and dip during this portion of the study. In addition, they were allowed to re-examine products and packages, as well as act out things such as pouring the chips from the bag or opening a jar. This free format was used to encourage the participants to stay in a social and emotional state of mind rather than to enter a more analytical pattern of thinking.

The observation of behaviors and verbal responses from the focus groups were used to inform the *Kansei* word matrix and creating the Likert-type evaluation matrix for the evaluation of the chips, packaging, and dips. Because it is important to maintain the social and emotional nature of the evaluation, words and phrases were taken from the formal questions, as well as from the informal group exchanges.

Word Inventory

"A *Kansei* word is a word describing the product domain" (Schütte, p58). For this study, *Kansei* words were collected using focus group information, literature, and *Kansei* studies. Words were collected from the focus groups, as well as from observing behaviors and actions that took place in the focus group studies. Additional words were also collected from the literature that exists on *Kansei* methods from other studies. The observation of behaviors and verbal responses from the focus groups were used to inform the *Kansei* word matrix and creating the Likert-type evaluation matrix for the evaluation of the chips, packaging, and dips. Because it is important to maintain the social and emotional nature of the evaluation, words and phrases were taken from the formal questions, as well as from the informal group exchanges.

Design Inventory

A preliminary design inventory was created by collecting a sampling of existing Frito Lay Tostitos Brand Products, packages, and jars. Five Tostitos® products; Restaurant Style, Bite Size Gold, Flour Tortilla, Bite Size, and Scoops (original), were selected for the study. These chips represent a variety of unique shapes, sizes, textures, colors, and thicknesses. The variations between the chips were used to create comparisons for the focus groups and testers to assess.

In order to create a design inventory for the chip package, five variations were created

based on the original scoops package. The specific variations were made in response to comments from the initial focus group information. The packages that were assessed have variations in how they use color images, position of graphic elements, size of logo, and the presence or absence of a clear window.

Chips

Based on their product design variations in physical and perceptual properties, five different styles of chips were identified to be tested and analyzed using the *Kansei* methodology. These chips: Restaurant Style, Bite Size, Gold Flour Tortilla, Bite Size, and Scoops, were selected because of the variety of sizes, shapes, colors, and materials that they represent. The Scoops chip was the actual chip that we were evaluating, but the evaluation was done in contrast to other Tostitos® products. So therefore, comparative data exists for each of the five varieties. All of the chips tested were made by Tostitos®.

From the responses collected in the focus groups, a *Kansei* word evaluation matrix for chips was developed. The *Kansei* evaluation matrix assesses the physical and sensory properties of the chips. (See Figure 2) These properties are a way of measuring the emotional response that people have towards the chips. A composite assessment score for physical responses to the chips and to emotional/social responses to the chips was made. The physical assessments focused on the properties of size, shape, color, and perceived tactile properties. The emotional and social assessment process focused on the sensory, emotional, and social aspects of the chips.

Physical Characteristics Assessment of Tostitos Chips

Five different chip styles were selected to measure *Kansei* properties. Each chip has unique characteristics. Following characteristics were identified for each chip for the basis of our evaluation: chip size, shape, color and other visual properties, the nature of pillowy air pockets, and the thickness of the chip. (See Table 1)

Table 1. the physical characteristic assessments for each of the chips used in the *Kansei* evaluation



Restaurant Style

Large size

Shape is triangular with angular corners

Color is light with areas of dark spots

Many areas of big pillowy air pockets

Thin Chip



Bite Size Gold

Small size (physically looks larger due to perception of the triangular shape vs. round shape of bite size chips)

Shape is a Rounded outer edge with a soft triangular point

Color is darker with a yellow hue and no areas of darker spots

Few areas of small pillowy air pockets

Thick chip



Gold Flour Tortilla

Small size (physically looks larger due to perception of the shape based on the lighter color than that of Bite size gold)

Shape is a Rounded outer edge with a soft triangular point

Color is light and no areas of darker spots

Some areas of small pillowy air pockets

Thin Chip



Bite Size

Small Size

Shape is round

Color is light with some area of dark spots

A few areas of small pillowy air pockets

Thin chip



Scoops (Original)

Big size (Top area size is similar to bite size but the increased depth of scoops make the actual and perceived size seem much larger)

Shape is fluted, bowl shape

Color is light with some areas of dark spots

A few areas of small pillowy air pockets

Thin chip

Packages

Each of the properties designed and tested in the six package variations were based on sensory, emotional, or social behaviors observed in the focus group evaluations. The original Scoops package, along with five new variations, were evaluated using an assessment matrix developed from the *Kansei* word matrix. The focus groups determined that some people prefer to see the actual product rather than a photograph. However, it was suspected that people also like to see how to serve a product, which is best achieved through an art directed photograph. In addition, the new designs sought to

test how much of the package design should be devoted to branding versus how much of the design should be devoted to product features. The new variations also explored the use of color to accentuate certain features or properties of the chips and their related graphics. Some of the variables tested in the new packages relate to physical properties of the chips, such as using a clear window to view them. Other design variables that were tested focused on perceptual attributes relating to the social and emotional properties of the chips, such as using a white bowl to make the chips appear lighter in color.

Physical Characteristics Assessment of Tostitos® Packages

Five paper package prototypes were created to measure *Kansei*. Each prototype was carefully designed to measure different variables based on the focus group study and design expertise of the design team. The characteristics of the chip packages that were evaluated include: logo size, color quality of printed images, the color of the bowl that displays the chips, the use of secondary images, and the use of a clear window to view the actual product through the package. The following are the physical characteristic assessments for each of the packages evaluated. (See table 2)

Table 2 Packages used in the *Kansei* evaluation.



Package A : Original package for Tostitos Scoops

Logo size is large

Color of Chip Image is printed and dark

Bowl Color is Purple

Secondary images of bowl of chips, single chip w/dip, dip jar, and drink

No Clear window to show actual product



Package B

Logo size is large

Color of Chip Image is printed and lighter in tone

Bowl Color is Purple

Secondary images of bowl of chips, single chip w/dip, dip jar, and drink

No Clear window to show actual product



Package C (Same as B with change in bowl color)

Logo size is large

Color of Chip Image is printed and lighter in tone

Bowl Color is white

Secondary images of bowl of chips, single chip w/dip, dip jar, and drink

No Clear window to show actual product



Package D (Same as B with change in visual emphasis of drink)

Logo size is large

Color of Image is printed and lighter in tone, drink is emphasized

with bright color of cup and contents

Bowl Color is Purple

Secondary images of bowl of chips, single chip w/dip, dip jar, and drink

No Clear window to show actual product



Package E

Logo Size is Smaller and masthead area is smaller

Color of chip image is printed as cutaway and lighter in tone

Bowl color is purple

Secondary images of bowl of chips, single chip w/dip, and dip

jar, no drink

Clear window is large to show actual chips



Package F (Same as E with chip bowl removed)

Logo Size is Smaller and masthead area is smaller

Color of chip image is printed as cutaway and lighter in tone

Bowl color is purple

Secondary images of single chip w/dip, and dip jar, no drink

Clear window is large to show actual chips

Sensory and Emotion Assessment

Assessment was based on placing the products in a matrix with seven incremental positions between the two descriptive words. The numbers were not present on the matrix used by the evaluator to make the evaluation more of an emotional than analytical response. When the data was analyzed it was given a code of 1 for the least favorable condition, a code of 4 for an uncertain response, and 7 for a completely favorable response. Scales were created for various categories in the areas of physical, emotional, social, sensory, and interaction by adding all pertinent variable for each scale and dividing this by the number of variables.

Assessment for Tostitos® Chips

The testing environment for the chips allowed the test participants to touch the chips and taste them if desired during the evaluation. Each chip was evaluated independently of the other chips by physically placing that chip on a matrix. The matrix had a sensory word pair on each side of the grid. These word pairs were separated by seven blank cells. By using a seven-step scale,

the evaluator can indicate levels of discrimination between the sensory variables, as well as indicate a neutral response. It was thought that a five step scale would not allow for enough subtlety of discrimination, while a nine or larger step scale would be physically more difficult to handle in the testing environment and would be more confusing to the evaluator. Later, at the time of analysis, the positions on the matrix were assigned a numeric value for statistical analysis. When each person finished ranking all aspects of one chip, the matrix was photographed to document their responses. They were then given the next chip to evaluate.

Physical Properties Assessment of the Chips

The evaluation data was divided into four categories that describe physical properties of the chips. These categories were size variables, shape variables, color properties, and physical health and wellness properties. The *Kansei* evaluation of size was determined to be a combination of how users emotionally responded to each chip with regard to how comfortable they perceived the chip, how easy they thought it was to eat, and how easy they thought it was to grab. A composite score for the *Kansei* response to the physical properties associated with size was based on the variables of comfortable, big, grabbing, and eating.

The physical shape of the chips was important to how people grab, dip, and eat the chips. The shape also contributed to how unique or enjoyable the chip was perceived to be. The *Kansei* evaluation of the physical shape of the chips was based on the variables of enjoyable, comfortable, healthy, happy, big, grabbing, and eating.

The physical color of the chip was influenced by its shape, size, and texture. The *Kansei* evaluation of the physical color of the chips was based on the following shape variables: color, fresh, healthy, tasty, and happy.

Physical health and wellness is an important factor when people choose foods and snacks. The *Kansei* evaluation of the physical health and wellness of the chips was based on the following shape variables: fresh, healthy, and salty. The following data shows that the bite size chip was perceived to be more fresh and healthy.

Sensory and Emotional Assessment of the Chips

The assessment of the chips was broken down into several categories. The sensory and emotional properties were put into two categories to measure those things that are related to the physical sensations of the body and those things that are essentially an emotional response to those physical and sensory properties. The areas that were focused on were visual, tactile, olfactory, auditory, and proprioceptive senses. The sensory category is comprised of the following variables: fresh, tasty, crispy, and crunchy.

The data showed that Scoops were considered the most effective in terms of their sensory and emotional properties. From a design perspective, this could possibly be attributed to the light color of the Scoops chips and their unique shape. The light color seems to elicit better responses with regard to perceived freshness. The unique shape may give the perception of a light and crispy formation.

The variables dealing with the emotional and social feelings associated with chips were grouped together to form the emotional/social evaluation criteria. These were properties that are more associated with feelings than with physical actions or interactivity. The emotional/Social variables are fresh, comfortable, happy, and enjoyable.

The bite size chips were perceived to be the highest in terms of their emotional/social variables. As previously stated, the light color of the chips seems to be perceived as more fresh from a visual standpoint. The other variables in this category indicate a level of comfort and satisfaction from the experience. Based on the observations from the focus group, the high ranking of the bite size chips in the areas of comfortable, happy and enjoyable are possibly based on the fact that their small size allows them to be eaten in one bite. This allows the person snacking to easily manipulate the chip while dipping and eating it. Some focus group participants also expressed comfort with this chip because they did not worry about double dipping the chip in a group snacking situation. It should be noted that the top two chips in this category, Bite Size and Scoops, are both light in color. However, of the two, the smaller chip, Bite Size, received the higher rank.

Assessment and Testing Environment for Packages

The testing for chip packages was done from color photographs printed on letter size paper. The participants viewed the images one at a time and then rated the package before moving on to the next evaluation. Photographs were used because all of the packages exist only as two-dimensional prototypes with the exception of package A, the only three-dimensional package.

Physical Properties Assessment for Packages

Based on information from comments and behaviors taken from the focus groups, the size of the package was considered an important element with regard to the *Kansei* of the product. The size of the chip package was assessed according to the rating given to holding the bag, pouring from the bag, perceived freshness, trustworthiness, and honesty. Some of the variables are physical such as how easy the bag is to hold, while other variables are emotional. The trustworthiness and honesty of the bag are considered an important *Kansei* measure with regard to the whole emotional experience of using and eating the chips. This aspect of the study also evaluated the proportion of the branding and graphics on the package.

The *Kansei* evaluation of Size Relationships and Proportional Relationships of Package Information was based on the following variables: hold, pour, fresh, trustworthy, and honesty. The data collected showed that package E was the most favorable with regard to size and proportional relationships. The original package was found to be the least favorable based on this evaluation. This may be due to the dark quality of the photograph on the original package. There were also comments from the focus groups that suggested that some people do not trust photographs and prefer to see the actual product through a clear window. By seeing the product, they feel that they can trust the product to be fresh and in good condition. They also feel that a photograph may misrepresent the size or color of the actual chips.

The color of the images was also considered important based on comments and observations from the focus groups. Specifically, if the color of the photograph of the chips was too dark or had a discernable color shift, some evaluators commented on the lack of freshness or appeal that they got from the packaging. The *Kansei* evaluation for color was based on the evaluations given to enjoyable, healthy, appealing, and fresh.

Package E was given the most favorable evaluation based on these criteria. This may be due in part to the fact that the package includes both an image of the chips as they might be served, as well as a clear area that allows the consumer to see the actual product. The photograph on this package was color balanced to give a more accurate color match to the actual product. This will be especially important if the package allows for a close comparison of the photo to the actual chips as is done in this package prototype. From information gathered in the focus groups, some participants felt that if they could not see the real product then they questioned whether they could trust it to be fresh and in good physical condition from shipping. It should also be noted that Package C scored second in this ranking. This may be due in part to the lighter color of the photograph and the fact that the chips are placed in a white bowl which further emphasizes the light color of the chips, a property that seems to be associated with perceived freshness.

The *Kansei* evaluation of perceived physical health and wellness was based on participant responses to healthy and fresh. While none of the chips scored high in health, some were clearly perceived to be more healthy than others. Package E was ranked highest in the area of physical health and wellness. This is probably due to the evaluators' preference for seeing the actual product. The two highest ranking packages, E and F, both have a clear window to show the chips. The next ranking package, C, does not include the clear window, but it does have the white bowl, which makes the chips seem lighter in color, a property which seems to be associated with freshness in the minds of the evaluators. The lowest ranking package, A, does not show the products and has the darkest photographic image of the chips.

The *Kansei* evaluation of physical interaction from Package Information was based on the following variables: opening, storing, holding, pouring, and use in a group. These things all deal with the physical actions that take place when interacting with the chips. Once again, Package E was perceived as the most accessible package in terms of the physical interaction variables. It was also followed by packages F and C, in that order. This seems to underscore the importance of a clear window for viewing the product in the minds of the evaluators. Not only does this feature increase the perceived freshness of the product, it also increases the perceived usability of the package. By making the package visually lighter and brighter through the use of lighter colors in close proximity to the chips and a clear viewing window, the evaluator preference for this package was increased in a somewhat universal way. In addition, the least preference was once again shown for Package A.

The *Kansei* evaluation of sensory variables from Package Information was based on the following variables: enjoyable, comfortable, appealing, and fresh. These variables measure those things that are less tactile in nature and more based on the senses. Package E was ranked the highest in sensory

assessment variables, followed by Package C. The large clear window, combined with the inset image of the chips in a serving bowl, gives the impression of freshness and visual appeal. Package C, with the white serving bowl, visually emphasizes the appealing and fresh aspect of the chips through the lighter color of the bowl which makes the chips themselves appear lighter.

The *Kansei* evaluation of the emotional and social aspects of the package information was based on the following variables: trustworthy, honest, enjoyable, comfortable, and use in a group. These variables most closely align with the emotional and social aspects of *Kansei*. They are also very similar to the Tostitos® marketing goals. Package E was also highest ranking in emotional/social assessment variables. In this case, the second ranking package is C. Both of these packages have emphasis placed on the serving bowl. However, Package E combines this with a large clear window to show the actual product, thus giving it a trustworthy and honest look together with the photographic image of a serving bowl to indicate the group snacking situation.

Conclusions

From a design standpoint, this combined method of ZMET, activity theory, and *Kansei* evaluation is a powerful tool for identifying which characteristics of a design are preferred by a specific user group. The methodology is unique in its ability to quantify emotional and social feelings about a product or package as a set of design criteria that can be used to firstly create a wide variety of new designs, then assess and refine these using this iterative process. It is also important in its ability to assess user responses to the product in the appropriate social setting and to evaluate the usability of the product under these circumstances. In terms of activity theory, it was found that a food such as Tostitos® does actually mediate a social situation. It is also true that the usability of that product is affected by social constructs such as proper group eating etiquette. Sensory properties of the chips and packages were found to be very significant. Physical properties such the feel of the chip was considered by many participants to affect their attitudes about the chip. In addition, the look of the bag was also considered highly important by many participants. The ability to see the actual chips rather than a picture of the chips before purchasing them contributed to a general feeling of honesty or integrity with regard to the product.

The research indicates that further studies could be done to determine more specific information about brand identity, color usage, product specifications, and social interactions between people and the Tostitos® products. It is important to keep all evaluations carefully focused on social and emotional data collection by removing cognitive cues such as numeric data or traditional evaluation forms from the test environment, as is ensuring that focus groups represent natural social groups in actual environments. It is our conclusion, that this method represents a clear departure from traditional cognitive focus group assessments. It is specific to the stated goals of Tostitos® and is very well suited to inform the product and package design process for the development of new and unique Tostitos® products.

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received a B.S. degree with majors in computer science and art from Morningside College in Sioux City, IA and an M.F.A. degree in Graphic Design from Iowa State University. She currently teaches graduate and undergraduate graphic design at Iowa State University. She has presented research nationally and internationally on visual literacy, the design of educational materials, and multi-sensory communication at numerous conferences including the American Institute for Graphic Arts (AIGA), the 6th Asian Design Conference (ACD), the International Visual Literacy Association (IVLA), and the Design Research Society (DRS). Her current research includes visual communication; multi-sensory design; interface design; designing for children with developmental delay and autism spectrum disorders; and experience design for medical facilities. During summer 2007, she conducted research with *Frito Lay* for Tostitos® Brand as a PI with Baer, Ladjahasan, and Kang.

Sunghyun Kang

received a B.F.A. degree in the field of applied art from Ewha Womens University in Korea. She earned a M.F.A. degree in graphic communication from the University of Houston and an M.A. degree in graphic design in 1999 from Iowa State University. She joined as a faculty of Department of Art and Design at Iowa State University in 2000. Her teaching and research is focus on graphic design, human interaction, web based design, and visual communication. She has over 15 years of experience in teaching, research, and consulting in these areas in Korea and U.S. She has presented and published at numerous conference including Asian Design Conference, Korean Society Design Conference, and Japanese Society for the Science and Design conference, and America Institute of Graphic Arts (AIGA). She serves as a juror for the Journal of Korea Society of Design Studies and served as a juror for the 6th Asian Design Conference. During summer 2007, she conducted research with *Frito Lay* for Tostitos® Brand as a co-PI with Baer, Ladjahasan, and Satterfield.

Roger Baer

Co-PI, came to Iowa State University and the College of Design in 1980 and has been an Associate Professor since 1984 and the Graphic Design Program

Director since 1982. He is a full member of the Graduate Faculty at Iowa State University. Professor Baer was Assistant Dean in the College of Design at Iowa State University for 6 years. His duties included facilities management, information technology management, and all collegiate communications. He is currently Chair of the Department of Art & Design, the largest and most diverse department in the college. His current interests in design education include curriculum development and accreditation for programs in graphic design; the relationship of practice to education and the role of graduate studies in graphic design; and the integration and utilization of information technology in the design fields. Recent consulting work has been in the area of product development and web site design and development. During summer 2007, he conducted research with *Frito Lay* for Tostitos® Brand as a co-PI with Kang, Ladjahasan, and Satterfield.

Nora Ladjahasan

received a BS degree in agricultural economics, University of the Philippines, MSC degrees in human settlement planning and community & regional planning at Asian Institute of Technology, Bangkok, Thailand, and Iowa State University. She is a PhD candidate at Iowa State University majoring in Sociology. She has been doing social science research for over a decade with a concentration in economic development, community studies, social policy and other art related projects related to social interaction and perception. Her statistical background was being utilized by the college in helping out faculty/staff and students in their research. She was a member of ISU's IRB for four years. During summer 2007, she conducted research with *Frito Lay* for Tostitos® Brand as a co-PI with Baer, Kang, and Satterfield.