UNDERSTANDING CHILDREN'S FOOD-RELATED EMOTIONS USING WORDS AND
EMOJIS IN THE UNITED STATES AND GHANA

by

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B.A., Lehigh University, 2008
M.S., Drexel University, 2011

AN ABSTRACT OF A DISSERTATION

submitted in partial fulfillment of the requirements for the degree

DOCTOR OF PHILOSOPHY

Department of Food, Nutrition, Dietetics, and Health
College of Human Ecology

KANSAS STATE UNIVERSITY
Manhattan, Kansas

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Abstract

Although consumer emotions have recently become a popular research area in the sensory and consumer sciences, there remains a need for an approach designed to evaluate children's food emotion experience. The objective of this research was to understand U.S. and Ghanaian children's emotion responses to food, using words and emojis. In the first part of the research, focus groups were conducted to understand children's use of emotion words and emojis in response to an array of food consumption experiences, both real and recalled. Through this study, a narrowed list of appropriate words and emojis was identified for further testing with children. This study also revealed that children readily use both emotion words and emojis to characterize their food experiences. The next phase of the research was conducted in three parts, which each included emotion assessments of children's favorite and disliked foods, as well a common set of eight products selected to elicit a broad range of emotions. First, the emotion set identified in focus group testing was used by children in the United States to assess pictures of foods. The responses from this study were used to further narrow the list of appropriate emojis and emotion words. Second, the reduced emotion set was used by children in the U.S. to assess appearance and post-taste emotions for the products. Finally, a food image test with the reduced emotion set was conducted in Accra, Ghana with schoolchildren. Fielding in Ghana allowed for an exploration of the considerations sensory researchers must make when conducting cross-cultural research with children. Emotion word and emoji usage was similar between U.S. and Ghanaian participants, although some differences were observed. The U.S. studies were compared, revealing the influence of stimulus type on children's reported emotions. Results from the actual food experiences (appearance, taste) were more positive compared to the evaluation of images. Finally, among Ghanaian and U.S. children, high frequencies of selection

for positive emotion words and emojis aligned with a favorite food experience. Overall, this research introduces a new approach to consumer emotion research with children for use both domestically and abroad.

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Chapter 1 - Introduction

Recently, consumer researchers have sought to understand consumer responses beyond liking to better understand consumer behaviors. Consumer emotions have become an important focus area within the consumer sciences, providing further insights into consumers' reactions towards products. Currently, most methods for emotion assessment of food products have been developed for and used by adult consumers. This leaves a need for a tool for emotion research with children. Children are an important and unique consumer group, requiring approaches that are made with their needs in mind. It is not enough to simply conduct testing with children using these tools developed for adults, because such an approach assumes that children have the same level of understanding and emotional constructs as an adult population.

In considering an approach towards a questionnaire-based emotion assessment with children, a review of the literature revealed two primary types of emotion assessment tools: textual and visual. A textual approach, such as the frequently studied EsSense Profile® (King and Meiselman 2010), has the benefit of being adaptable to a variety of applications (e.g. printed ballots, internet surveys) while using terms that are definable, but there are limitations to this approach. First, vocabulary limitations or literacy level among certain populations, including children, can limit the applicability of such a tool. Additionally, emotion words can be difficult to translate across languages, running the risk of losing meaning. On the other hand, visual emotion tools, such as PrEmo®, eliminate the barriers created by terminology by providing visual representation of emotion (Desmet 2003). For PrEmo® specifically, the consumer is asked to rate a product on an emotion conveyed by a cartoon animation with a matching vocal expression. While the visual and auditory characteristics of this approach make it ideal for conducting consumer testing beyond language barriers, it is limited in the sense that it requires technology

for data collection. Although the world is becoming increasingly connected to the internet, there remain parts of the world where limited internet connectivity and problems with the power grid can make it difficult or impossible to conduct research that relies on technology or web connectivity for data collection. For example, as of 2015 less than a quarter of the population of Africa uses the internet (International Telecommunication Union 2016) and countries such as Ghana often face long power outages due to an unreliable supply of electricity (Amoah 2005). With these issues and benefits of these emotion tools in mind, a two-part approach was considered for emotion assessment with children, using both emotion words and emojis.

Emojis are small pictorial images used in mobile and web communications. Among the most widely used emojis are the face emojis, which convey a range of emotions. Emoji usage is so prevalent that an emoji, Face with Tears of Joy, was named the Oxford Dictionaries Word of the Year in 2015 (Oxford University Press 2015). Several food companies have sought to harness the power of emojis, including PepsiCo's PepsiMoji campaign (2016) and a limited Taco Bell promotion after a successful petition to Unicode for a taco emoji (Taco Bell 2015). At the same time, children are increasingly using cell phones and social media. Half of children have a social media account by the age of 12 and the average child owns their first cell phone shortly after they turn 10 years old (Influence Central 2016). Additionally, in 2013 more than a third of U.S. children had used a tablet before being able to speak a sentence (Common Sense Media 2013). With the prevalence of emojis and children's growing familiarity with digital communications, emojis were considered for the present research to convey emotions and engage participants.

Although the research began in the United States, an important element of this research was the comparison of responses across cultures. The world is filled with consumers, so

consumer research tools should aim to address the needs of all consumers. Many published

cross-cultural consumer research studies consider individuals in North American, European,

and/or Asian markets, and there exists a need for further research with African consumers,

particularly children. Emerging markets, such as Ghana, represent a young and growing

population with a unique culture, providing an opportunity for researchers to explore cultural

differences in consumer responses.

Research Outline

This dissertation consists of 4 studies, which are described and examined in five chapters.

A visual describing the flow of the research is provided in Figure 1.1. Prior to testing, a review

of the literature was conducted to identify emotion words used by consumers to assess food-

related emotions. These terms were screened for duplication and vocabulary level, using a

vocabulary development tool called *The First 4000* words (Graves *et al*. 2015). Emojis were

obtained from Apple® iOS 8.3 (used with permission), and reviewed by researchers to eliminate

emojis deemed to be inappropriate for children in the evaluation of food.
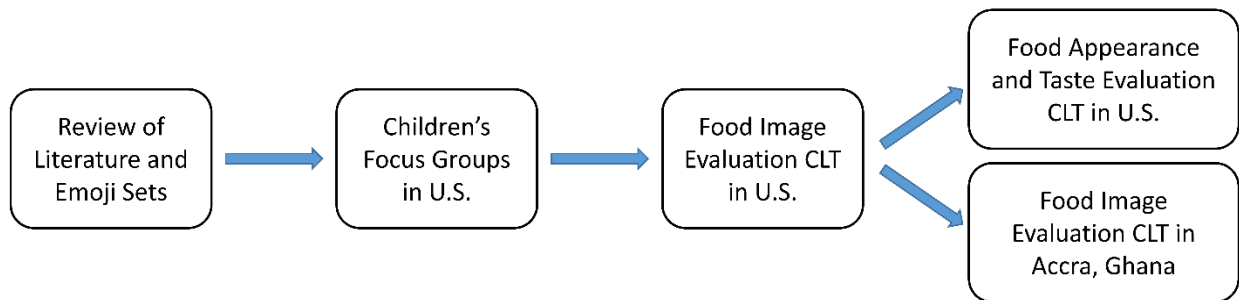
FIGURE 1.1 RESEARCH PLAN FLOW CHART.

In the first study (Chapter 3), focus groups were conducted with children aged 8 to 11

years to understand children's usage of words and emojis to describe both current and recalled

experiences with foods and beverages. Children's feedback from this study was used to

eliminate words or emojis that were not applicable to children's experiences with foods.

Additionally, children weighed in on the use of words and emojis in sensory testing and provided their perspectives on how such research should be conducted.

In the second study (Chapters 4, 5, 6, and 7) children in the United States assessed images of foods and beverages using the emojis and words identified through focus group testing. Respondents also provided feedback on the valence (positive, negative, neutral) of emotion words and emojis. Children's usage of words and emojis, as well as their valence categorizations, were used to further narrow the list to 28 words and 28 emojis used in subsequent testing.

In the third study (Chapters 5, 6, and 7) children in the United States assessed the appearance and taste of actual foods. The foods used in this study were the same as those shown in photographs in the second study. This study provided information about children's experiences with actual food products, as opposed to the images presented in the previous study.

The fourth study (Chapters 4, 5, and 7) was fielded in Accra, Ghana to understand Ghanaian children's responses to images of foods and beverages. The questionnaire from the second study was adapted for testing in Ghana, to allow for comparison between U.S. and Ghanaian children. Studies were fielded in grade schools in Ghana to understand children's emotion responses to pictures of food, as well as Ghanaian children's perceptions of emotion word and emoji valence.

Chapter 3 details the results of the focus group study, providing perspective on children's usage of emotion words and emojis, as well as their thoughts on answering questions about emotions related to food consumption experiences. Chapter 4 compares the usage of emojis and emotion words in the United States and Ghana to understand the similarities and differences in usage between the two cultures. In Chapter 5, research considerations for conducting cross-

cultural testing with children are outlined to provide researchers with a background on problems

that may arise when conducting such research. Findings from the U.S. data sets were compared

in Chapter 6 to understand differences in emotion responses from children when considering

food image, food appearance, and food taste as stimuli. Finally, in Chapter 7 data from studies 3,

4, and 5 were combined to understand children's emotion responses related to favorite and

disliked food experiences.

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Chapter 2 - Literature Review

Today's consumers are faced with a wide array of choices, and as a result, liking alone provides limited insights into consumers' food choice behavior. To add to the findings gathered through hedonic assessment, there has been an increasing need for approaches that go further and provide deeper understanding of the consumer product experience, such as the measurement of consumer emotions. In the last decade, food emotion research has grown in popularity in the consumer sciences, and several methods have been developed to meet different emotional measurement needs. Despite these advances, there remains a need for a tool intended for the assessment of various foods to understand food-related emotions with children.

Children are an important consumer group. Although they have minimal income as compared to their more often studied adult counterparts, children play a role in food purchase decisions. In addition, children are a unique consumer group with skills and abilities that differ from adults. Therefore, it is essential to thoroughly test methods for use with children to ensure that the approach is appropriate for the consumer group.

Defining and Assessing Emotions

Although emotions are a key and common component of the human experience, emotions are not easy to define. In the field of psychology, researchers have proposed several approaches to explain the structure of affect. Russell (1980) presented evidence for a circumplex model of affect, in which affective stars are interrelated, as illustrated by a circular model. The circumplex model is a two-dimensional (pleasure-displeasure and degree-of-arousal) model in which eight emotional states are arranged around a circle in increments of 45°, where similar concepts are located closely together on the circle and opposite terms are on the opposite side of the circle. The emotional states are ordered as follows: pleasure (0°), excitement (45°), arousal (90°),

distress (135º), displeasure (180º), depression (225º), sleepiness (270º) and relaxation (315º). This model, which included 28 words, was supported by experimental results from studies on individuals both with and without a background in the psychological sciences.

Another early emotion tool, the Multiple Affect Adjective Check List – Revised (MAACL-R), is a tool that was developed for clinical research to assess five affective factors: tense-anxious, sad-depressed, irritated-angry, elated-feel good, and excited-anticipation (Lubin *et al.* 1986). Assessments are collected to understand current effect, as well as "in general". As the name suggests, the tool, which was designed for patient assessment, is structured as a checklist.

To create a simple scale for the measurement of affect, Watson, Clark and Tellegen, developed the Positive and Negative Affect Schedule (PANAS) (1988). The authors sought to fill the need for a reliable, valid, and easy to administer scale for affect assessment. The resulting scale contains 10 positive and 10 negative affective terms on which subjects can rate their feeling in response to the given occasion. This scale has been used across disciplines, and was recently employed by sensory researchers to understand consumer emotions related to the aroma of phytonutrient supplements, for which both the positive and negative dimensions differentiated the samples (Kuesten *et al.* 2014).

Mehrabian framed emotional temperament in the three-dimensional Pleasure-Arousal-Dominance (PAD) Emotional State Model (1996). This model is used to explain differences in temperament and helps to predict personality characteristics such as anxiety, extroversion, and aggressiveness. A limitation of this approach is that it does not necessarily measure specific emotions, and is more appropriate for the understanding of emotional states in response to environmental stimuli (Richins 1997).

While marketing and consumer research had been using emotions to understand consumers' responses to advertising, Richins argued that a consumption-specific emotion set was needed to understand the consumption experience. Unlike emotions experienced vicariously through advertising, Richins argued that consumption emotions are generally experienced, and likely encompass a narrower range of emotions. Through extensive testing with consumers, this research yielded the Consumption Emotion Set for consumer's responses to their possessions (Richins 1997).

Laros and Steenkamp (2005) built upon the work of Richins and proposed a hierarchical model of consumer emotions to unite the concepts of affective emotion categorization with specific emotions. The model consists of three levels: superordinate (positive & negative affect), basic level (4 positive & 4 negative basic emotions), and subordinate (specific emotions). An illustration of this model is shown in Figure 2.1. The researchers compared the superordinate and basic levels of emotions for different food products. Results showed that the specific emotions provide important insights into the consumer experience, which may be lost by only considering the broader categorization of emotions by positive and negative affect.

Superordinate	Negative Affect				Positive Affect			
Basic Level	**Anger**	**Fear**	**Sadness**	**Shame**	**Contentment**	**Happiness**	**Love**	**Pride**
Subordinate	Angry	Scared	Depressed	Embarrassed	Contented	Optimistic	Sexy	Pride
	Frustrated	Afraid	Sad	Ashamed	Fulfilled	Encouraged	Romantic	
	Irritated	Panicky	Miserable	Humiliated	Peaceful	Hopeful	Passionate	
	Unfulfilled	Nervous	Helpless			Happy	Loving	
	Discontented	Worried	Nostalgia			Pleased	Sentimental	
	Envious	Tense	Guilty			Joyful	Warm-hearted	
	Jealous					Relieved		
						Thrilled		
						Enthusiastic		

FIGURE 2.1 A HIERARCHICAL MODEL OF CONSUMER EMOTIONS (LAROS AND STEENKAMP 2005).

Measuring Consumer Emotions

Emotions play a key role in the consumption experience and influence consumer satisfaction (Phillips and Baumgartner 2002). In conjunction with consumer liking responses, food-related emotions can help researchers better predict consumers' food choices (Gutjar *et al.* 2015). To better meet the needs of consumers, researchers have sought to understand these emotions using a variety of tools.

Visual Approaches to the Measurement of Consumption Emotions

Emotion Through Human Facial Expression

Facial expressions can be an important source of information about conscious and subconscious emotions, but assessing consumer emotions through examination of facial response provides some challenges. Bredie *et al.* (2014) observed facial responses to basic taste stimuli, which were rated by a panel trained in emotion rating. While some differences were detected, observed changes in facial expressions were weak, limiting the amount of information that could be gleaned through facial expression alone. A study on the consumers' emotional response to sweeteners also showed limited facial differences between samples when using face reading technology (Leitch *et al.* 2015). In another approach to facial assessment, researchers used face reading technology to measure facial reactions to orange juices in two conditions: automatic reactions where participants did not know their facial responses were being recorded, and intentional expressions where participants were instructed to make a face to rate the sample. Results from the automatic and intentional conditions were similar and both approaches showed significant differences across the samples, however product discrimination was better when expressions were intentional (Danner *et al.* 2014).

Facial expressions of emotion in a consumer's surroundings can also influence food choice. Barthomeuf *et al.* (2009a) looked to understand respondents' desire to eat when viewing photographic expressions of pleasure, neutrality, and disgust towards liked and disliked foods. They found that the positive expression of another individual towards a disliked food had a greater impact on the participants' desire to eat the food than in the liked food context. Although liking and disliking were not strongly impacted by the photographic emotion expressions, desire to eat was impacted, which may in turn impact food choice.

Recently, Collinsworth and colleagues (2014) introduced an image-based emotion tool for emotion and texture methods called Image Measurement of Emotion and Texture (IMET). This method employs researcher-selected images to convey texture, while consumers pre-selected images to represent a researcher-selected set of emotions. The image-based approach showed improved differentiation within a category when compared to a text approach for both orange soda and cheese stick samples. The findings from this research also suggest that when consumers use self-identified images as representations of positive emotions, their responses tend to be less variable than when using positive emotion terms alone.

Emotion Through Non-Human Images

The Self-Assessment Manikin (SAM) is a visual, non-verbal scale that allows users to rate pleasure, arousal, and dominance in response to stimuli (Bradley and Lang 1994). Each emotion state is presented as a sequence of 5 images, which is presented with a 9-point rating scale for assessment. Figure 2.2 shows the images used to illustrate the levels of pleasure, arousal, and dominance. This tool was recently used to understand children's responses throughout meal preparation with a parent, and found that children who helped their parent cook the meal had greater increases in valence and dominance responses when compared to children

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who did not assist with meal preparation (van der Horst *et al.* 2014). Kuenzel and Martin (2012) also used SAM, along with the differential emotions scale (DES-III) emotion tools with children to understand their emotions related to the consumption experience. They found that children were able to use these questionnaires, and both valence and arousal differentiated products.
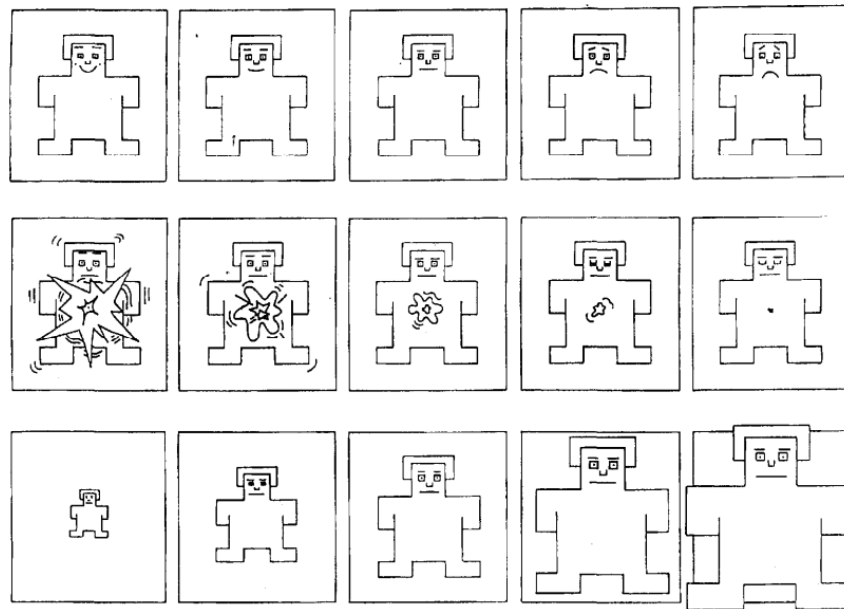
FIGURE 2.2 THE SELF-ASSESSMENT MANIKIN FOR THE RATING OF VALENCE (TOP ROW), AROUSAL (MIDDLE ROW), AND DOMINANCE (BOTTOM ROW) (BRADLEY AND LANG 1994).

Non-verbal approaches to emotion assessment, such as those which use physiological measures or facial expressions to measure reactions to stimuli, are generally only limited to characterizing basic emotions. As a result, researchers risk missing the finer details within consumers' product-related emotion experience. Emotion word-based methods are common in sensory for their ability to capture feedback for a range of emotions, but there are challenges in adapting these tools for broader use. For example, when conducting cross-cultural consumer emotion research, translation of an established emotion lexicon to other languages can be

difficult and meaning may be lost. Additionally, verbal methods limit participants based on their literacy or vocabulary understanding. To deal with some of these issues, Desmet *et al.* (2000) developed the Product Emotion Measurement Instrument (PrEmo®), an animated emotion measurement tool. PrEmo® was developed to understand positive and negative affective animations, which consumers watch, and then rate their responses to the stimulus on a 5-point scale ("not at all" to "extremely"). In a cross-cultural study, participants found the animations more intuitive and enjoyable versus a verbal approach (Desmet 2003). Although this method was developed for non-food products, researchers have used the tool to understand food-related emotions. Gutjar and colleagues (2015) used PrEmo to assess breakfast beverages and found that the tool was able to differentiate between products and provided additional information that was not measured by liking alone.

FIGURE 2.3 THE PREMO USER INTERFACE (SUSAGROUP 2016).

Word-Based Approaches in Consumer Emotions

Although word-based approaches have long been used in clinical emotion assessment, Desmet and Schifferstein (2008) presented one of the first efforts in characterizing food-related emotions. For both recalled and tasted emotion responses, consumers reported higher usage of positive emotions, a phenomenon the authors refer to as "hedonic asymmetry". However, it should be noted that the food selected for tasting, while chosen to include a range in quality,

come from product categories that are generally well-liked (sweet snack, savory snack, and pasta meal). Despite this limitation, the list of 22 emotion words resulting from this research provided foundation for the understanding of consumers' specific emotions in response to foods.

EsSense Profile®

King and Meiselman (2010) conducted a series of studies to develop the EsSense Profile®, a set of 39 emotions selected specifically for their relevance to food. To identify appropriate terms for the study, existing lists of emotion terms were joined with participant-generated terms for a broad set of emotions. These words were then narrowed based on the following criteria: usage frequency (minimum of 20% on a checklist questionnaire), categorization as positive or negative (unclassifiable if > 50% of participants rate the word as neither positive nor negative or both positive and negative), and consumer feedback on the word's appropriateness to food testing. Along with a liking assessment, the 32 terms in the EsSense Profile® were evaluated in two formats: check-all-that-apply (CATA), shown in Figure 2.4, and a 5-point rating scale (1 = "not at all" to 5 = "extremely"). The differences between the CATA and rating approaches were further explored in research aimed at identifying the best practices for EsSense Profile® questionnaire design (King *et al.* 2013). The rating scale was more sensitive in differentiating on terms that had low selections in CATA, while CATA was better at differentiating emotions with high selection frequencies. Overall, the rating approach was more sensitive as compared to a CATA presentation, but certain studies may warrant the use of CATA (e.g. reduction of emotion terms for use within product category).

How much you LIKE or DISLIKE (*product*)?

Dislike extremely	Dislike very much	Dislike moderately	Dislike slightly	Neither like nor dislike	Like slightly	Like moderately	Like very much	Like extremely
❑	❑	❑	❑	❑	❑	❑	❑	❑

Please select the words which describe how you **FEEL RIGHT NOW**. *Select all that apply.*

❑ Active	❑ Glad	❑ Pleasant
❑ Adventurous	❑ Good	❑ Polite
❑ Affectionate	❑ Good-natured	❑ Quiet
❑ Aggressive	❑ Guilty	❑ Satisfied
❑ Bored	❑ Happy	❑ Secure
❑ Calm	❑ Interested	❑ Steady
❑ Daring	❑ Joyful	❑ Tame
❑ Disgusted	❑ Loving	❑ Tender
❑ Eager	❑ Merry	❑ Understanding
❑ Energetic	❑ Mild	❑ Warm
❑ Enthusiastic	❑ Nostalgic	❑ Whole
❑ Free	❑ Peaceful	❑ Wild
❑ Friendly	❑ Pleased	❑ Worried

FIGURE 2.4 THE CHECKLIST VERSION OF THE ESSENSE PROFILE® BALLOT FOR ACCEPTABILITY AND EMOTION ASSESSMENT (KING AND MEISELMAN 2010).

Since its introduction, the EsSense Profile® has been tested extensively in the area of food-related emotion research. Jaeger and Hedderly (2013) observed a relationship between consumers' psychological traits and responses using the EsSense Profile®. Among consumers who responded more strongly towards positive experiences in their daily lives, positive emotion words were rated higher than individuals with weaker responses to positive experiences. In another study, researchers investigated the emotion tool from the perspective of the consumer. Jaeger *et al.* (2013) conducted research on the EsSense Profile® and consumers' free elicitation of emotions to understand the questionnaire from the perspective of the participant. Consumers provided more responses using EsSense Profile® than a free response approach. While participants felt that EsSense Profile® was easy, some thought that emotions included in the method were "odd", which led to confusion as to the relationship between the emotion and foods. The participants in this study were from New Zealand, while the EsSense Profile® was

initially developed with American consumers, and therefore some of the differences observed may be due to cultural differences between these countries.

In an assessment of blackcurrant squashes, the EsSense Profile® resulted in a limited emotion space when compared to consumer-defined emotion questions. The authors attributed this difference to the reduced number of negative emotions in the EsSense Profile® compared to the consumer-defined responses, which were more balanced in positive and negative emotions. On the other hand, the EsSense Profile® included terms which were not generated by consumers, but were relevant to distinguishing products (Ng *et al.* 2013).

Nestrud *et al.* (2016) have introduced a shortened version of the EsSense Profile®, named EsSense25. This new take on the EsSense Profile® is a list of 25 terms, reduced from the original 39 emotions. A hierarchical clustering procedure was conducted on emotion sorting data to identify words which could be eliminated to form a shorter emotion list. The reduced set was validated through another sorting experiment, and the 25-word version was tested against the original list to compare consumer responses. Responses between the methods were similar, but the authors caution that researchers should consider the differences between the lists when comparing studies or choosing a method for new research.

Consumer Differences in Emotion Responses

In an investigation of brewed coffees, Bhumiratana *et al.* (2014) developed an emotion lexicon for the evaluation of coffees, tailoring the list of emotion words used to the coffee drinking experience (CDE). In this research, they found that different consumers' coffee preferences were influenced by the emotion experience associated with that coffee, specifically related to high or low energy emotions. While positive emotions were sought by all participants, some consumers preferred positive low-arousal emotions (e.g. joy, comfortable) in their coffee

experience, while other consumers liked coffees that they associated with positive high-arousal emotions (e.g. energetic, boosted). The emotion responses using CDE emotions provided further differentiation of the coffees beyond liking measures alone, allowing for further understanding of the product differences.

Another group of researchers in Switzerland investigated the emotions reported during the coffee experience based on consumers' motivation (hedonic vs. function) (Labbe *et al.* 2015). They found that the emotions throughout the coffee drinking experience differed for the two groups: those who were motivated by enjoyment reported more positive emotions throughout the coffee preparation and drinking experience, while those motivated by stimulation experienced more positive emotions only after drinking the coffee. The authors suggested that an understanding of the emotion experience based on consumer motivation can help marketers target messages for consumer groups.

In a university food court setting, researchers found that although emotions did not impact meal choice, the meal did impact experience emotions, with observed increases in lethargic emotions post-meal (Edwards *et al*. 2013). In unstructured interviews discussing recalled experiences, researchers found that undergraduate students noticed differences in their emotional state before and after a lunch time meal, citing food quality, physical setting, and social factors as impacting their emotional experience (Brown et al. 2013).

Emotion responses can also be used to highlight differences in consumers based on product usage frequency. Researchers in France obtained emotion responses to images of foods to women of high and low meat consumption, and found that less frequent meat consumers expressed more negative emotions towards meat than women who ate meat more frequently.

Children, Food, and Emotions

Despite the growth of research in consumer emotions, there remains a need for more work in understanding consumer emotions with children. In a review of 15 years of food preference research with children, Laureati *et al.* (2015) reported a scarcity of literature on children's emotions related to liking.

To understand the relationship between BMI and food emotions, researchers conducted testing with food images and normal weight, overweight, and obese adolescents. They found that negative emotion intensities towards palatable foods were highest for obese participants compared to overweight and normal weight adolescents (Barthomeuf *et al.* 2009b). Gender differences have also been observed in emotion research with adolescents, as girls experienced more anxiety-related emotions than boys, although there were no anger-related emotion differences by gender (White et al. 2015).

An emotion tool for children's assessment of plain and flavored milks was developed by researchers in Belgium (De Pelsmaeker *et al.* 2013). Emotion terms used in this approach were compiled from previous emotion research and children's own terms related to milk brands, which yielded 9 positive, 9 negative, and 2 neutral emotions presented as a CATA question. As is often observed in emotion research with adults, children used positive emotions more frequently than negative emotions related to milk brands. Researchers were able to differentiate brands based on emotion responses, but the list is limited in that it was developed specifically for use with flavored milk products.

Children as Consumers

Children are an important and unique group of consumers. While children tend to be limited in their spending power, they should not be ignored by manufacturers of consumer

goods. As of the 2010 U.S. Census, individuals under the age of 18 account for 24% of the

population (Howden and Meyer 2010). In the United States, family dynamics have changed in

recent years so that today's children have more power over family purchase choices than

children in previous generations (Mintel 2016). The importance of children as consumers is not

lost on food and beverage markets. In 2009, major food and beverage companies spent $1.79

billion on advertising to kids (Federal Trade Commission 2012). Children are important

consumers for food and beverage manufacturers abroad, as well. In a cross-cultural study of

child consumers, McNeal (1993) reported that snacks and sweets accounted for the largest

expenditure among children ages 4 – 12 in Hong Kong, New Zealand, Taiwan, and the United

States. In India, researchers found that children had the largest influence over products that are

used by children, such as snacks or toys (Sharma and Sonwaney, 2014). To meet the needs of

children as a consumer group, it is important to understand factors that influence their choices.

Children influence a variety of food purchases for the household, including the choice to

eat a lunch at school. In a telephone survey of parents, researchers found that parents perceived

the school lunch choice as a joint decision between parent and child. Parent choices weighed

heavier when nutrition was a factor, while children tended to make the decision when the overall

menu and the taste of the food were important factors (Meyer *et al.* 2002). Product taste and

parent influence were also seen to play a role in a survey of children aged 7 – 8 years in the

United Kingdom, which showed that children's snacking choices are primarily influenced by

taste, followed by parent's influence and availability of items (Bower and Sandall 2002).

Sensory and Consumer Research with Children

Consumer testing with children requires consideration of the abilities of the participants;

it is not enough to simply replicate procedures used in testing with adults. In planning studies

with children, researchers must consider the developmental stage of their participants and compose study procedures within the framework of the children's abilities. While this presents a challenge to researchers, this does not mean it is not worthwhile to conduct testing with younger subjects. As Popper and Kroll (2005) explain, children have different motivations in their product choices, and may struggle more with abstract concepts, but research has shown that children are capable of providing valuable feedback in both qualitative and quantitative testing, provided the test is appropriately designed.

In conducting research with children, it is important to understand their developmental abilities. For sensory evaluation with children, ASTM has produced a standard, which details important considerations for researchers (ASTM 2012). Included in this standard are recommendations for children based on the skills and behaviors of that group. Figure 2.5 shows the ASTM framework for children ages 5 to 15 years, which includes age appropriate guidance for testing development.

Children of different ages may use sensory scales differently. In a study of milk and milk substitutes, Palacios and others found that although results were directionally similar for children of different age groups, older children used a wider range of the scale and had stronger dislikes than younger children (Palacios *et al.* 2010). Researchers in Italy had similar results in a study on school lunches, where they found that older children were willing to be more critical and had a wider range of acceptability scores, whereas younger children tended to give positive scores for all foods (Pagliarini *et al.* 2015). In additional to influencing how scales are used, age can also play a role in the abilities of children. Liem *et al.* (2004) observed that 4-year olds were able to show differences in sweetness preference between sugar sweetened samples, but struggled with rank order and paired comparison tasks, although 5-year old children were successful in these

Skill/Behavior	Beginning Readers 5 to 8 years	Pre-Teen 8 to 12 years	Teenage 12 to 15 years
Language—Verbal, Reading/ Written Language, Vocabulary	Moderately developed verbal and vocabulary skills; cognitive skills increase. Early reading and writing skills vary greatly at this age. Adult assistance is advised.	Increasingly verbal—self-expression improves. Reading and written language skills increase rapidly and are sufficient for most self-administered tasks at the upper limits of this age group.	Generally strong language and vocabulary skills. Reading and written language skills continue to increase. Adult level in most respects.
Attention Span	Limited by understanding of task and interest level, challenge. Limit tasks to < 15 min.	Attention span is increasing, but holding interest is critical and sometimes difficult. Taking tests is a familiar activity.	Similar to adults, involvement and interest subject to peer pressure.
Reasoning	Developing with increased learning, cause/effect concepts.	Full ability for understanding and reasoning, capable of decision making.	Reasoning skills are fully developed and similar to adults.
Decision Making	Ability to decide is increasing, but influence of adult approval is evident.	Capable of complex decisions, peer influences a factor.	Fully capable of adult decision processes, subject to peer influences.
Understanding Scales	Scale understanding increasing, simple is best, use easy vocabulary.	Capable of understanding scaling concepts with adequate instruction.	Similar to adults.
Motor Skills	Gross motor skills developed, fine skills becoming more refined.	Hand to eye and other fine motor skills developed.	Similar to adults.
Recommended Evaluation Techniques	Behavioral Observations Diaries Consumption or duration measurements Paired Comparison Sorting and Matching Limited Preference Ranking One-on-one interviews Simple attribute ratings Liking scales—pictorial or simple word scales. Group discussions Concept testing	Previous, plus more abstract reasoning tasks. Hedonic scales. Simple attribute scaling and ratings.	Capable of all adult evaluation techniques.
Adult Involvement	Experimenter or Interviewer. Generally able to handle self-administered tasks.		Adult participation not required, unless appropriate to evaluation technique.

FIGURE 2.5 SUMMARY OF SKILLS AND BEHAVIORS OF CHILDREN AGES 5 TO 15 YEARS (ADAPTED FROM ASTM 2013).

discriminatory tasks. French researchers also observed that discrimination methods with younger children were not reliable, but children aged 5 to 10 years were able to complete testing activities with non-verbal methods, including ranking by elimination, paired comparison, and hedonic categorization (Leon *et al.* 1999). Although age is generally used to target children by

developmental stage, children of the same age can vary widely in their skills, background, and attention span, and researchers must be prepared to deal with these differences (Kimmel *et al* 1994).

Despite limitations that may exist, particularly with younger children, a wide array of tests are appropriate for sensory testing with children. In an assessment of fruit punches, children 8 years and older were able to complete a scaling task, and the three scales used (facial, verbal, and box) performed similarly (Spaeth *et al.* 1992). Children as young as 5 were able to complete a structured sorting task, which employed images to convey liking/disliking and healthy/less healthy (Varela and Salvador 2014). Children can provide valuable insights in qualitative research. Banister and Booth suggested activities such as drawing or photography in qualitative research as ways to help children explain their experiences (Banister and Booth 2005).

Although sensory research with children must certainly take into consideration the abilities of children when designing testing, researchers must not simply assume that children will be unable to complete a task without evidence to support the choice. Swaney-Stueve (2001) conducted research to assess children's ability to complete a descriptive analysis task, although other researchers suggested that children would not be able to complete the task. Perhaps surprisingly, children as young as 9 years old were found to serve as consistent descriptive panelists, and effectively described sample differences, rated product attributes, and displayed and an overall understanding of the task.

Culture and Sensory Testing

With the ever-broadening global consumer marketplace, it is necessary to understand the role that culture plays in sensory test outcomes. A problem commonly encountered by

individuals partaking in cross-cultural research is the struggle of adapting a method across a language barrier. Translation of questionnaires can be complicated and require a process involving multiple bilingual translators to ensure equivalency between the questionnaires, which may require a combination of multiple translation techniques to achieve this goal (Cha *et al.* 2007).

Beyond the differences in language, cultural differences can also impact study results. Cultural viewpoint can influence the framework within which a consumer sees a product. In a test on barbeque sauces, researchers found that Asian consumers emphasized holistic characteristics (e.g. familiarity, mild flavor) to explain their likes and dislikes, while American consumers referred to more specific characteristics (e.g. appearance, moistness) (Choi *et al.* 2014). Cultural identity can also impact familiarity with certain foods and beverages.   Akissoe *et al.* (2014) conducted research on a traditional African yogurt-like product (Akpan) in both Africa and Europe. Consumer testing results were subjected to cluster analysis, which revealed nationality as the primary difference between clusters, as the African participants were more accepting of the familiar, fermented cereal. Kim and colleagues (2013) also observed and impact of familiarity in Napping® results for green tea. These researchers observed better discrimination between samples by Koreans, who were more familiar with the product, as compared to French consumers, who differentiated the samples by acceptance.

Cultural differences are important to understand, because they can even influence study outcomes between cultures with a shared language. Antmann and colleagues (2011) studied creaminess perception in 3 Spanish-speaking countries and found that perceptions of the meaning of creaminess were different, even with the shared language. Rakotosamimanana *et al.* (2015) conducted research with a bilingual population to understand the differences in

descriptors between Malagasy and French in describing a novel food. The results of this study show that language did not impact study conclusions, suggesting that differences that are often observed in cross-cultural research may be influenced by culture more so than by language.

Non-verbal Communication and the Rise of Emojis

Online and mobile communications have become a key part of daily conversations. With the move towards more non-verbalized communications, the tools that we use to communicate have adapted. Such adaptations include emoticons and emojis, which are in widespread use today.

Emoticons

In the early years of electronic, text-based communication, conversations lacked important cues present in face-to-face communications, such as gestures, facial expressions, and prosodic features of speech (e.g. rhythm, intonation). Before the common use of emoticons, a faculty member at Carnegie Mellon University suggested the use of sideways images constructed of ASCII symbols to indicate the valence of text, with :-) intended to indicate a joke, and :-(to let the reader know the writer is not joking (Williams 2007). These sideways images constructed of ASCII symbols became widely used in Western cultures with the increase of online and mobile communications. In Japan, kaomoji, a horizontal-style emoticon, became popular in early online communications. A cross-cultural comparison of emoticon usage revealed that individualistic cultures tended to use horizontal emoticons which are differentiated by mouth characteristics (e.g. :-), :-P), while collectivistic cultures tended to use vertical emoticons which are focused on eye characteristics (e.g. ^_^, T_T) (Park *et al*. 2014).

Emoticons serve several purpose when used in conjunction with text communications, from emphasizing the accompanying text, to changing the sentiment of the message, or adding a

sentiment when none is present in the text (Yamamoto *et al.* 2015). Walther and D'Addario (2001) suggest that emoticons add to Computer-Mediated Communication (CMC) by helping the writer regulate their message to ensure that they're communicating the intended message. However, Lo (2008) observed that emoticons can influence the reader's perception of the emotional messaging, and suggest that emoticons serve in CMC as "quasi-nonverbal cues". Emoticons have also been studied to understand the response of the brain to these stimuli. In addition to activating the part of the brain involved in verbal processing, sentences with emoticons activate the right interior frontal gyrus, which plays a role in emotion judgement and understanding non-verbal information (Yuasa *et al.* 2011).

Emojis

While emoticons are a set of characters which are combined to represent an image, emojis are small pictorial objects which are commonly used in online and mobile applications. Today, common emoji sets adhere to the Unicode standard of emojis, which standardizes the basic features of the emoji. Despite this standardization across emojis, a wide range of unique emoji sets are available and documented in an online encyclopedia of emojis called Emojipedia (Burge 2016).

In an investigation of online chat rooms, Fullwood and colleagues (2013) found that likeliness of MSN emoji usage was similar across age groups. Additionally, while females were more likely to use emojis than males in the chat rooms, the range of emojis used were similar between genders.

To understand emoji usage, researchers investigated emoji usage in Kika Keyboard, a popular emoji keyboard application for mobile devices. The data for this research included information from 3.88 million users and 212 countries. From this data, the researchers found

that 7.1% of messages collected over a month contained at least one emoji. In each country, face emojis were most commonly included in the most frequently used emojis, except for France, where emojis with hearts were more popular. Although many emojis are available, only 119 of the 1281 emojis offered in Kika Keyboard accounted for about 90% of emoji usage. Overall usage of emojis in conversation was significantly different by culture (Lu et al 2016).

Sensory researchers used emoticons to label food packages, with a happy face indicating a healthy product and a sad face on items that were not healthy. These packaging changes were effective in altering grocery shoppers' perceptions of healthiness, as well as reducing the impact of ambiguous health-related label statements, such as "wholesome goodness" (Privitera *et al.* 2015a). In another study with children, healthful foods with emolabels were chosen by grade school children more often than the same foods without emolabels (Privitera *et al.* 2015b). Sensory researchers have also considered consumers' use of emojis as a potentially valuable source of consumer insides. Twitter data were revealed that consumers are using emojis and emoticons when sending tweets about food occasions, suggesting these characters may be of use in further consumer emotion research (Vidal *et al.* 2016).

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Chapter 3 - A Focus Group Approach to Understanding Food-Related Emotions with Children Using Words and Emojis

Abstract

Focus groups were conducted to understand children's use of emotion words and emojis to describe reactions to foods. A total of 17 children, ages 8 to 11, were asked to use words and emojis to describe how they felt in response to self-selected favorite, least favorite, and 'just okay' foods before, during, and after recalled consumption occasions. Participants also provided responses to three food interventions before tasting, after tasting, and after seeing product packaging. Additionally, the group discussed emotion words and emoji valence (positive, negative, neutral). Participants readily used words and emojis in discussion and activities to communicate how foods made them feel (e.g. good in response to eating a favorite food, angry face when recalling a disliked food). Words and emojis not considered for further testing were either infrequently used (fewer than 3 times across all activities and groups), redundant (based on children's usage), or not used to describe a feeling in response to a stimulus. Based on children's use of the words and emojis through discussion and activities, a list of 51 words and 38 emojis were considered appropriate for further emotion testing with children ages 8 to 11.

Practical Applications

This research addresses the need for a food emotion tool for use with children. The findings show that children are able to use both words and emojis to describe their emotions in response to varied products. The resulting lists of words and emojis can be used in subsequent quantitative testing with children.

Keywords

Emotion, children, food, emojis

Introduction

To better understand consumer choices, some researchers have focused recently on emotions to provide information beyond product liking to better predict consumer behavior. Although clinical approaches to emotion assessment have been used for decades, methods tailored to consumer goods have been developed more recently to understand emotions relevant to the user experience. Verbal approaches, which use emotion words applicable to the consumer experience, have been used frequently in emotion research (Desmet and Schifferstein 2008; King and Meiselman 2010) for general products and also have been used for more specific cases such as coffee (Bhumiratana *et al.* 2014). A non-verbal approach, the Product Emotion Measurement Instrument (PrEmo), consisting of 12 cartoon animations with sound, allows for emotion assessment without cultural or language barriers that may exist with verbal approaches (Desmet *et al.* 2000). Dalenberg *et al*. (2014) used both PrEmo and the word-based EsSense Profile[TM] in their research and found each emotion approach, in conjunction with liking, provided stronger predictions of consumer choice than models based on liking alone.

Emotion methods for consumer research, such as the EsSense Profile[TM] and PrEmo, have been developed primarily for use with adult consumers, as opposed to children. One exception is an emotion list developed by De Pelsmaeker *et al.* (2013) to understand children's emotions in response to flavored milks. This approach combined terms from previous emotion research, as well as children's own terms generated through focus groups, but the list was developed solely based on the brands of milk used in the study. As a result, the list generated through this research may not contain the emotions necessary for children to assess a wider variety of foods

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and beverages. Currently, there is no emotion tool for children's evaluation of a broad range of foods and beverages.

Children are an important consumer group with unique needs. In an international study conducted by Nickelodeon, children were found to play an important role in household choices, from television programming decisions to food and clothing purchases (Kurz 2012). In a survey of 48 major food and beverage marketers, the Federal Trade Commission reported $1.79 billion spent in 2009 on advertising to consumers under the age of 18 (Federal Trade Commission 2012). To understand the needs of this influential consumer group, it is recommended to tailor testing procedures to the needs and abilities of children (Guinard 2000; Urbick *et al.* 2001). Spaeth, Chambers, and Schwenke (1992) discussed age appropriateness of tests with children and showed that children ages 8 and older were able to make scaled decisions on products much in the same way that adults were. Other reports state that from ages 8 to 12, children are able to make complex decisions and can explain their opinions of products (ASTM E2299-13 2013), making this age group ideally suited to provide feedback on new questionnaire methodology.

To understand children's perceptions and attitudes, a focus group approach allows for open discussion of children's own ideas and the opportunity to probe further into meaning. Focus groups are the most commonly used tool for exploring consumers' ideas (Jervis and Drake 2014), and can help uncover consumers' own perceptions and beliefs. Focus groups have been used in sensory testing to understand consumer vocabulary for coffee (Kobayashi and Benassi 2015), emotions related to the coffee drinking experience (Bhumiratana *et al.* 2014), picky eating (Boquin *et al.* 2014), and children's emotions associated with milk brands (De Pelsmaeker *et al.* 2013).

In creating an emotion tool for food evaluation with child consumers, we considered a two-part approach: the commonly used emotion word list and a pictorial list of emojis. With the continued growth of online and mobile connectivity, communication has transformed to be faster and more visual. Early internet communication included emoticons, expressions formed from standard keyboard symbols. Over time, emoticons have evolved into emojis, small pictures which can be used to convey expressions or clarify a message. These images are incredibly popular on social media and text message platforms, particularly among individuals under the age of 24 (Cruse 2015). Emojis provide a visual display of emotion, making them beneficial for use with populations such as children, who may not have the vocabulary to convey all of their emotions. Vidal *et al.* (2016) analyzed Twitter data and observed that consumers readily use emojis and emoticons when talking about food, and those authors suggested that emojis may have use in the development of a non-verbal emotion method.

The purpose of this research was to understand children's emotion responses to food using words and emojis. The results of the current research can be used to develop a food emotion tool for children.

Materials and Methods

Recruitment

Three, 90-minute focus group sessions were conducted with children between the ages of 8 and 11 years old. A total of 17 children participated in the sessions, which are detailed in Table 3.1. Focus groups with older children were divided by gender, as recommended by Morgan *et al.*(2002). Parents and legal guardians in the Sensory and Consumer Research Center database were contacted via email and asked to complete a screener using Compusense at-hand (Compusense Inc., Guelph, Ontario, Canada). All focus group participants were enrolled in

public or private schools at the time of the study and had no food allergies or dietary restrictions. Children also were screened for behavior in groups and willingness to participate in a 90-minute focus group session. All participants were at least somewhat willing to try new foods, as well as willing and able to complete a brief homework assignment prior to their session. Participants were provided with monetary compensation at the end of the session.

TABLE 3.1 FOCUS GROUP DEMOGRAPHICS

Group	Number of participants	Age	Gender	Time of day
1	8	10 to 11 years	Male	4:30 pm (After school)
2	4	8 to 9 years	2 male, 2 female	1:00 (no school day)
3	5	10 to 11 years	Female	4:30 (After school)

Setting

All focus groups were conducted in a well-lit conference room with audio and video recording capabilities at the Kansas State University Olathe campus in October 2015. Video and audio were recorded using Zoom software (Zoom Video Communications Inc., San Jose, CA, USA), which was transmitted live to a researcher observing the sessions. Both the focus group moderator and the observer had completed training at the RIVA Training Institute (Rockville, MD, USA). Participants sat around the conference table facing the moderator, whose back was facing the wall-mounted video camera. A microphone was placed at the center of the table to capture audio. Each participant's place was set with a name card, a pencil, a highlighter, a sheet of see-through colored stickers (Avery® 5473, Avery Products Corporation, Meridan, MS, USA), and worksheets containing emotion words and emojis. Sheets of Post-it® Easel Pad paper were pre-labeled "positive", "negative", and "neutral" and adhered to a dry-erase board for the group sorting activity. An easel with paper was positioned adjacent to the moderator's chair for

notation of child-generated emotion words. Purified drinking water and unsalted crackers were

provided for all participants.

Methodology

Emotion Words

Example lists of possible food related emotion words and faces were compiled for use in focus

groups to facilitate discussion. Words provided were sourced from published literature on food

and consumer emotions (Desmet and Schifferstein 2008; King and Meiselman 2010; De

Pelsmaeker *et al.* 2013). To reduce the list to a set appropriate for research with children, the

vocabulary development tool *The First 4000 Words* was used to eliminate words. *The First 4000*

Words is a list of the 4,000 most commonly used words in the English language and is used for

vocabulary development with children grades 1 through 4 (Graves et al. 2015). Words that were

not on this list, or did not contain a word stem on this list, were removed from the final word list

provided in the focus groups, as shown in Table 3.2. One exception to this rule was made for the

word cozy, since the source of this term was an emotion list developed with children ages 8

through 13 (De Pelsmaeker *et al.* 2013).

TABLE 3.2 EMOTION TERMS PROVIDED TO CHILDREN IN FOCUS GROUPS

Active	Adventurous	Anger	Bad
Bored	Calm	Childish	Cozy
Daring	Desire	Disappointed	Dissatisfied
Eager	Energetic	Enjoyment	Fear
Free	Friendly	Glad	Good
Guilty	Happy	Hope	Interested
Joyful	Loving	Mild	Peaceful
Pleasant	Pleased	Pride	Quiet
Relief	Sad	Satisfied	Secure
Steady	Surprised	Ugly	Understanding
Warm	Whole	Wild	Worried

Emojis

Emojis were obtained from Apple® iOS 8.3 (Apple, Inc., Cupertino, CA, USA, used with permission). Only face images were retained for use in focus groups. A researcher reviewed all face images and eliminated emojis that were deemed irrelevant or inappropriate for children's food emotion assessment, such as an emoji wearing a surgical face mask. The resulting set of emojis used is shown in Figure 3.1. Emojis were numbered as shown to facilitate group discussion rather than providing descriptive identifiers, such as *disappointed face*, so as not to bias children's interpretations of the faces. Since the Apple images are copyrighted, an alternative emoji set is provided in Figure 3.2 using images from Emoji One (http://emojione.com, Accessed June 9, 2016), an emoji set available for free under a creative commons license, which adheres to the same Unicode standard as the Apple® images.

FIGURE 3.1 EMOJI TABLE PROVIDED TO CHILDREN IN FOCUS GROUPS (™APPLE, INC., USED WITH PERMISSION)

Emoji	Emojipedia Definition	Emoji	Emojipedia Definition	Emoji	Emojipedia Definition	Emoji	Emojipedia Definition
	Smiling Face With Open Mouth and Smiling Eyes		Face With Stuck-Out Tongue and Winking Eye		Expressionless Face		Face With Cold Sweat
	Smiling Face With Open Mouth		Face With Stuck-Out Tongue and Tightly-Closed Eyes		Disappointed Face		Tired Face
	Grinning Face		Frowning Face With Open Mouth		Persevering Face		Fearful Face
	Smiling Face With Smiling Eyes		Hushed Face		Crying Face		Smiling Face With Sunglasses
	Smiling Face		Smirking Face		Face With Tears of Joy		Grimacing Face
	Winking Face		Face With Stuck-Out Tongue		Loudly Crying Face		Smiling Face With Open Mouth and Tightly-Closed Eyes
	Face Without Mouth		Flushed Face		Sleepy Face		Face Screaming in Fear
	Anguished Face		Grinning Face With Smiling Eyes		Sleeping Face		Angry Face
	Face With Open Mouth		Pensive Face		Neutral Face		Pouting Face
	Smiling Face With Heart-Shaped Eyes		Relieved Face		Face Savouring Delicious Food		Face With Look of Triumph
	Kissing Face With Closed Eyes		Unamused Face		Disappointed but Relieved Face		Confounded Face
	Kissing Face		Worried Face		Face With Open Mouth and Cold Sweat		
	Kissing Face With Smiling Eyes		Confused Face		Smiling Face With Open Mouth and Cold Sweat		

FIGURE 3.2 ALTERNATIVE OPEN SOURCE EMOJI SET FROM EMOJI ONE (HTTP://EMOJIONE.COM)

Homework

Prior to the session, children completed a two-part homework assignment, which was sent by email to the parent or guardian. For the first task, children identified their favorite food, their least favorite food, and a food that is "just okay". Participants were instructed to provide as much detail as possible to explain what they liked or disliked about each of the foods, and were encouraged to express themselves through writing or drawing. For the second task, children were provided with an example menu of lunch foods, obtained from the Olathe School District (Olathe, KS, USA) school lunch menu, and asked to indicate days of the week they would eat

lunch. Children were also instructed to indicate foods on the menu that they liked, did not like, or were "maybe good or maybe bad".

Focus Group Methods

Homework Discussion

After providing participants with background about the focus group structure, the moderator opened each session by asking children to state what they had eaten for the previous meal to begin a discussion of foods. Then, the homework assignment on self-selected foods was discussed. The moderator asked questions about children's reasoning for their opinions towards these foods and probed to understand children's feelings/emotions before, during, and after eating each of the foods. All emotions reported by children were recorded on an easel by the moderator so that these words would remain visible to participants throughout the session. After an initial discussion of the foods from the homework assignment, the moderator encouraged the participants to review the lists of emotion words in Example lists of possible food related emotion words and faces were compiled for use in focus groups to facilitate discussion. Words provided were sourced from published literature on food and consumer emotions (Desmet and Schifferstein 2008; King and Meiselman 2010; De Pelsmaeker *et al.* 2013). To reduce the list to a set appropriate for research with children, the vocabulary development tool *The First 4000 Words* was used to eliminate words. *The First 4000 Words* is a list of the 4,000 most commonly used words in the English language and is used for vocabulary development with children grades 1 through 4 (Graves et al. 2015). Words that were not on this list, or did not contain a word stem on this list, were removed from the final word list provided in the focus groups, as shown in Table 3.2. One exception to this rule was made for the word cozy, since the source of this term was an emotion list developed with children ages 8 through 13 (De Pelsmaeker *et al.* 2013).

Table 3.2 and emojis in Figure 3.1 to explain how these foods make them feel. Throughout this discussion, children were asked to use clear, colored stickers, a pencil, or a highlighter to indicate the words or emojis they would use to describe how they feel in response to eating or seeing each food. For each item, the moderator instructed the group as to which sticker color or writing utensil to use when marking emotion words or emojis on their worksheets corresponding with the food. This allowed the researchers to review worksheets after the groups and identify words or emojis that were used by children but not verbalized. When needed, the moderator reminded children also to use words or describe faces that were not included on the lists provided.

Food Intervention

Three food interventions were completed to allow children to provide emotion responses to products before, during, and after consumption. Participants also used the clear, colored stickers to identify words and emojis that they would use to describe the foods presented during the intervention. Intervention foods were brought to the study room by the observing researcher, who followed the moderator guide (see Appendix A) and live video to determine the appropriate serving time for each item. Foods were selected by the researchers to elicit different emotions in children before, during, and after consumption. The first sample, Quaker® Instant Oatmeal – Original (PepsiCo, Purchase, NY, USA), was prepared according to package stovetop cooking instructions and served in a covered, 5 oz. foam bowl. Plain oatmeal was selected to understand emotions concerning a common product that was anticipated to be liked, while eliciting low excitement relative to other the foods provided. The second sample, Lunchables™ Pizza with Pepperoni (Kraft Foods Group, Northfield, IL, USA), was selected as an interactive product to elicit any emotions associated with customization and product involvement. The crust, cheese,

pepperoni, and sauce components were served separately and divided amongst participants to give each child an opportunity to construct their own pizza. The pepperoni and cheese were served together in a lidded 3.25 oz. soufflé cup, the sauce was portioned into a lidded 2 oz. soufflé cup and served with a tasting spoon, and a half piece of crust was served on a 5.875 in. foam plate covered with plastic wrap until serving. All components of the pizza were served directly from the refrigerator. Hata Ramune Strawberry Soda (CTC Food International Inc., San Francisco, CA, USA) was selected as an uncommon and foreign beverage with unique packaging features. Ramune is a Japanese soda that comes in a glass Codd-neck bottle, which is a bottle sealed with a marble. To drink the product, the consumer uses a plunger to dislodge the marble, which remains in the bottle while pouring. The soda was served from refrigeration and poured into a lidded 3.25 oz. soufflé cup by the observer just prior to serving. For each food, children discussed emotions before tasting, after tasting, after seeing the package, and in the case of the Ramune, after watching the product being opened. Packages of the products were kept in closed storage next to the moderator chair, allowing the moderator to determine the appropriate timing for the packaging discussion.

Emotion Word and Emoji Valence

Following the food intervention, participants were asked to sort the words and faces that they would use to describe how foods make them feel into positive, negative, or neutral categories. Participants were given adhesive note pads, as well as printed stickers with the words in Example lists of possible food related emotion words and faces were compiled for use in focus groups to facilitate discussion. Words provided were sourced from published literature on food and consumer emotions (Desmet and Schifferstein 2008; King and Meiselman 2010; De Pelsmaeker *et al.* 2013). To reduce the list to a set appropriate for research with children, the vocabulary

development tool *The First 4000 Words* was used to eliminate words. *The First 4000 Words* is a list of the 4,000 most commonly used words in the English language and is used for vocabulary development with children grades 1 through 4 (Graves et al. 2015). Words that were not on this list, or did not contain a word stem on this list, were removed from the final word list provided in the focus groups, as shown in Table 3.2. One exception to this rule was made for the word cozy, since the source of this term was an emotion list developed with children ages 8 through 13 (De Pelsmaeker *et al.* 2013).

Table 3.2 and the faces from Figure 3.1 to streamline the activity. The moderator also encouraged participants to write words or draw faces not included on the list. Children wrote, drew, or placed stickers on the note pad, then placed the note on the pre-labeled paper with the appropriate categorization (positive, negative, or neutral). During this task, children were also asked to think about foods and emotions related to foods that hadn't already been discussed during the session. Children were given time to place their words and emojis in the appropriate category, and then the group discussed the placement, providing examples to explain their choices.

School Lunch and Taste Test Discussion

After completing the sorting task, the group had a brief discussion about the lunch menu homework assignment. The moderator probed to understand emotions associated with the foods and reasons children gave for deciding whether or not to eat lunch on a given day. Each group concluded with a discussion about taste testing. The moderator asked participants about their familiarity with taste testing, types of questions children have seen on taste tests, children's opinions on being asked about emotions during a taste test, and preference between the word and emoji approaches to emotion assessment.

Data Analysis

After each session, the moderator and the observer discussed the themes and key findings from the focus group. Within one week after the session, the researchers reviewed the recordings to further investigate themes in the discussions. Data collected from the worksheets, group notes, and sorting activities were compiled to further understand children's use of emotion words and emojis. Key emotion words and emojis were identified through a review of frequently used words and emojis across the discussion, worksheets, and activities.

Results

Explaining Food & Beverage Likes and Dislikes

When initially explaining reasons behind their likes and dislikes of foods, children relied on descriptions of product characteristics to explain their attitudes towards foods and beverages. During the discussion of favorite, least favorite, and "just okay" foods selected for the homework assignment, children mentioned flavor, texture, aroma, appearance, temperature, and spiciness as factors that influence their liking. One participant liked the combined elements of pizza, stating "I like cheese and I like pepperoni, and they go really good together", while another child liked the varied components of tacos "because you can have options with it". Pizza was a common favorite, with positive characteristics such as the "spicy taste from the pepperoni" and the portioning of pizza into slices "so you don't have to get too much". Favored textures were described as "soft", "creamy", "tender", and "juicy". When describing foods that are "just okay", participants largely referred to the texture, such as Salisbury steak being "too juicy", pancakes that are "dry", and "moist" pasta. When discussing least favorite foods, children primarily talked about flavor ("really bland", "tastes weird") and texture ("too crunchy", "slimy", "soggy"). As with favorite foods, combinations of ingredients in least favorite foods

were discussed, with statements such as "Tacos and salad don't go together." and "I don't like the hot cheese with bread."

When food interventions were introduced, children's immediate concerns continued to center on understanding product characteristics. Before tasting the oatmeal, participants mentioned aroma ("It smells plain.") and appearance ("It doesn't look like it has much flavor.") while discussing the anticipated flavor. A similar pattern was seen with soda, where children described the aroma as "cherry" and "strawberry", with an appearance like "fruit punch". Children were also interested in identifying brands of the unlabeled pizza and soda samples, with at least one child in each session identifying the pizza as Lunchables™ shortly after the sample was served for the visual assessment. When considering items on a school lunch menu, participants talked about their familiarity with foods and their expectations of product characteristics such as flavor and texture to explain whether or not they would choose to eat lunch that day. Although the initial discussion of each item focused on product characteristics, children readily discussed emotion words and emojis related to foods and beverages once prompted.

Using Emotion Words to Describe Foods & Beverages

When asked to describe how they feel before consuming their favorite foods, children listed feelings such as good, happy, excited, "like it's my birthday", thankful, joyful, peaceful, and satisfied. After having their favorite foods, children reported feeling safe, full, and sad "because it's all gone", adding "I want more of it". Several participants mentioned feeling warm after eating their favorite food, but further probing revealed that this feeling was related to the temperature of the food, rather than an emotion. When considering how they feel before eating their least favorite foods, children stated and marked on their worksheets they felt anger,

disappointed, disgusted, and mad. After eating these foods, participants said they felt sick,

bored, disgusted, and "good that you're over with eating the food".

TABLE 3.3 WORDS GENERATED BY CHILDREN THROUGH FOCUS GROUP DISCUSSION TO DESCRIBE FEELINGS IN RESPONSE TO FOODS AND BEVERAGES

Amazed	Amazing	Beautiful	Bitter
Careless	Cheerful	Complex	Confused
Cool	Delicious	Depressed	Disgusted
Empty	Excited	Extraordinary	Fine
Full	Great	Gross/Grossed Out	Horrid
Hungry	Hyper	Mad	Mouthwatering
Nauseous	Nervous	Neutral	Normal
Okay	Powerful	Relieved	Safe
Scared	Sick	Silly	Thankful
Tired	Upset	Weird	

Children's initial reactions to oatmeal before eating included emotion words similar to

those used for their least favorite food, such as anger, disappointed, and bored. In addition,

participants used words like calm, surprised, and relief to describe how they felt after trying the

oatmeal. The lack of flavor surprised several participants, and one child explained, "I thought it

would have more taste to it." After seeing the package, a participant was surprised because it

"looks better on the box", referring to the image of oatmeal with raspberries on the package.

Upon seeing the pizza, children felt excited, happy "because I've never tried this before",

adventurous, energetic, interested, and "more full, more satisfied". Children felt "more active"

in response to the pizza as compared to the oatmeal, although one participant reasoned that they

might feel differently about the pizza had it not been preceded by plain oatmeal. After

constructing and consuming the pizza, participants felt energized, satisfied, happy, and calm.

The ability to customize the product to their own tastes made children feel powerful and

adventurous, "because I got to make it". Some of the older males discussed a feeling of

disappointment due to the small sample serving size used to divide the product among

participants, and one participant asked the moderator, "Why didn't you just give us a Lunchables™ pack?"

The soda made children feel active, excited, joyful, and happy when the drink was first served. After trying, children who liked the drink felt adventurous "because I'm happy and want to explore", and excited, while children who disliked the beverage felt disgusted and disappointed. When the opening of the bottle was demonstrated, some participants felt surprised, curious, and interested. Other children felt scared or worried, explaining "I'm afraid it's going to turn out like a champagne bottle." and "I'm worried I'm going to choke on the marble."

Overall, children were positive to the lunch menu options from the homework assignment. Emotion words similar to those used when talking about their favorite foods were used to talk about days when they would want to eat lunch. Children listed words including good, happy, excited, and cheerful to describe how the menu made them feel on days when they would want to eat lunch. On days that children would not eat lunch, they said that the foods made them feel upset, disgusted, and sad.

Using Emojis to Describe Foods & Beverages

Several children expressed immediate familiarity with emojis upon seeing the worksheets, and children readily used the emojis to describe how foods made them feel. Much of the discussion about emotions and food centered on words, perhaps because of the difficulty in communicating emojis in a verbal context, however a review of the worksheets revealed that children were using both words and emojis throughout the session to characterize the foods & beverages. Across the groups, 10-11 year old girls referenced emojis in their discussion more frequently than 8-9 year olds or 10-11 year old boys. When comparing discussion, worksheet, and sorting activity responses across the three groups, 10-11 year olds relied more heavily on

emojis than 8-9 year olds when describing their emotions related to foods. However, it must be pointed out that only one group of 8-9 year olds was held and this could be a group specific comment. Further research is needed to determine if this observation holds true across other groups of children 8 to 11 years old.

For the discussion of specific emoji usage, emojis will be referred to by definitions obtained from Emojipedia, an online encyclopedia of emojis (Burge 2016). Definitions are provided alongside each emoji in Figure 3.3.

In the discussion and on the worksheets, children used *smiling face with open mouth*, *smiling face with open mouth and smiling eyes*, *grinning face,* and *face savoring delicious food* to In the discussion and on the worksheets, children used *smiling face with open mouth*, *smiling face with open mouth and smiling eyes*, *grinning face,* and *face savoring delicious food* to describe how both the pizza and their favorite food made them feel. *Smiling face with heart-shaped eyes* also was commonly marked on worksheets and mentioned when discussing favorite foods. While the conversation about least favorite foods centered on emotion words, children used several emojis on their worksheets to explain how they feel, including *loudly crying face*, *pouting face*, *angry face*, *face screaming in fear*, and *face with look of triumph*. In children's discussion and on worksheets, oatmeal was most frequently associated with emotions expressed by *disappointed face*, which was related to feeling "sick", and *grimacing face*. Participants marked emojis on their worksheets more frequently for pizza than for the other food samples. Emojis frequently selected on participants' worksheets to describe emotions associated with

Emoji	Emojipedia Definition	Emoji	Emojipedia Definition	Emoji	Emojipedia Definition	Emoji	Emojipedia Definition
	Smiling Face With Open Mouth and Smiling Eyes		Face With Stuck-Out Tongue and Winking Eye		Expressionless Face		Face With Cold Sweat
	Smiling Face With Open Mouth		Face With Stuck-Out Tongue and Tightly-Closed Eyes		Disappointed Face		Tired Face
	Grinning Face		Frowning Face With Open Mouth		Persevering Face		Fearful Face
	Smiling Face With Smiling Eyes		Hushed Face		Crying Face		Smiling Face With Sunglasses
	Smiling Face		Smirking Face		Face With Tears of Joy		Grimacing Face
	Winking Face		Face With Stuck-Out Tongue		Loudly Crying Face		Smiling Face With Open Mouth and Tightly-Closed Eyes
	Face Without Mouth		Flushed Face		Sleepy Face		Face Screaming in Fear
	Anguished Face		Grinning Face With Smiling Eyes		Sleeping Face		Angry Face
	Face With Open Mouth		Pensive Face		Neutral Face		Pouting Face
	Smiling Face With Heart-Shaped Eyes		Relieved Face		Face Savouring Delicious Food		Face With Look of Triumph
	Kissing Face With Closed Eyes		Unamused Face		Disappointed but Relieved Face		Confounded Face
	Kissing Face		Worried Face		Face With Open Mouth and Cold Sweat		
	Kissing Face With Smiling Eyes		Confused Face		Smiling Face With Open Mouth and Cold Sweat		

FIGURE 3.3 EMOJIS WITH DEFINITIONS FROM EMOJIPEDIA

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pizza included *smiling face with* sunglasses, which was discussed along with the noise "mmm hmm"*, smiling face, smiling face with smiling eyes,* and *winking face*. Fewer emojis were mentioned in the group discussion of soda, which may be due to a position effect, since this sample was always seen last. The most commonly marked emoji on participants' worksheets during the discussion about soda was *smiling face with open mouth and tightly-closed eyes*. When talking about emojis relevant to the soda, *pensive face* was used by participants to express dislike towards the soda, while *relieved face* was used by children who liked the soda.

Emotion Word & Emoji Valence

Participants relied heavily on words or faces provided in completing the sorting task, rather than using words generated by the group or drawing their own faces. In each group, at least one child struggled to understand the word "neutral", which led to a group discussion of the meaning and alternative phrasing. Multiple children indicated that "so-so" would be a better alternative. Other alternatives to "neutral" included "just okay", "regular", and "normal". The youngest group tended to use more positive words and emojis to characterize their food experiences, while the older children had more variation with their use of positive, negative, and neutral words and emojis.

Words placed on the "positive" paper included happy, joyful, active, interested, glad, enjoyment, free, and friendly. Positive emojis included *smiling face with open mouth*, *grinning face, smiling face with open mouth and smiling eyes, smiling face with heart-shaped eyes*, and *smiling face with sunglasses*. Good was categorized as both positive and neutral.

Negative words included bad, disappointed, dissatisfied, and anger. Emojis consistently placed on the "negative" paper were *pouting face*, *angry face*, *face with look of triumph*, and *disappointed face*. *Pouting face* was described as "angry". Worried was placed on both the

"negative" and "neutral" sheets, along with *face without mouth, expressionless face, grimacing face*, and *confused face*, which children described as "confused" and "surprised".

Calm, bored, and mild were characterized as neutral by participants. The only face consistently placed on the "neutral" paper was *relieved face*. One emoji, *smirking face*, was placed in positive, negative, and neutral categories by different participants. The word childish had different meanings to the different age groups. Younger children tended to use childish as a positive term and used the word related to foods that made them feel like a little kid. Older children used childish in a more negative manner, describing childish as similar to guilty, "because I didn't want to try the food". One of the younger girls could see the word as being both positive and negative, explaining that childish can be used, "when you're laughing and having fun", but could also be "a negative comment, like an offensive word".

Emotions in Taste Testing

Overall, children were positive towards the idea of being asked questions about emotions during a taste test and thought that "it would be fun". In this qualitative group situation, slightly more participants favored the emojis over the words. One child who preferred the emojis over words remarked, "It was easier to use the faces." These participants indicated that emojis allowed for the expressions of feelings "when you don't really have the right expression to explain them". For these children, emojis also had the benefit of being more engaging, with one participant remarking that they "look fun". The participants anticipated that they would be excited to complete a taste test using emojis. One girl stated of the focus group that she was "really happy, because I really like emojis". On the other hand, children who preferred using the words liked that they knew exactly what the researcher was asking. One participant explained, "For me it's easier to see words, because I'm a big reader." Another child "liked the words

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more, because they describe it a little bit better". Clarity of response seemed to be an important factor for those who thought the words were better than the emojis as conveying their emotions toward food.

Discussion

Overall, children had a positive response to using emotion words and emojis to discuss how different foods made them feel. Emojis, a new approach to consumer emotion evaluation, were well received by the focus group participants, and some children stated they preferred emojis over words when characterizing emotions referring to foods. Children 10-11 years appeared to rely more heavily on emojis than younger children across the focus group activities and discussion, which may be an effect of age and more familiarity with technology, or could be due to study timing. Focus groups with 10-11 year olds were held after school, which researchers have cautioned may negatively impact the attention span of participants (Popper and Kroll 2005; Urbick *et al.* 2011). In this situation, emojis may have been more appealing to the children after a full school day, as opposed to the 8-9 year old children who participated on a school holiday. Additional research is recommended to further explore age and gender differences in usage of emojis and emotion words to convey food-related emotions.

Due to low use, several words and emojis were eliminated moving forward in quantitative testing with children aged 8 to 11 years. Based on the criteria of use across all groups and activities of three times or less, the following words were eliminated from further testing: guilty, secure, steady, understanding, and whole. Additionally, childish was eliminated due to disagreement in term definition, and warm was eliminated because children associated the term with temperature. The term warm also is a good example of the importance of probing for understanding in focus group situations. This research on emotions clearly could have

interpreted the response "warm" or as an emotional term meaning cozy, feeling good, or "warm and fuzzy" (sentimental). Emojis eliminated due to low usage across groups were *kissing face*, *kissing face with smiling eyes*, *hushed face*, *smirking face*, *grinning face with smiling eyes*, *face with tears of joy*, *sleepy face*, *smiling face with open mouth*, and *face with cold sweat.* Some emojis were redundant and used similarly throughout the focus groups. *Smiling face with open mouth* and *smiling face with open mouth and smiling eyes* were removed for subsequent testing because they were used in a similar manner to *grinning face*. *Expressionless face* was retained, the similarly used *neutral face* was eliminated due to redundancy. It is important to note that although certain words and emojis were less useful for this group of children, these words and emojis may still be useful when conducting research with children beyond this age group.

After reviewing children's own emotion words and eliminating terms that were not used to refer to an emotion, 15 words are suggested for further consideration in emotion testing with children. Emotions can be difficult to define, and there are discussions throughout the literature of what constitutes an emotion (Mulligan and Scherer 2012; Scherer 2005; King and Meiselman 2010). For the purpose of this research, an emotion was defined as a feeling in response to a stimulus. Children's own interpretations of the words and usage during focus group discussions were used to determine whether or not the term was being used as an emotion, rather than imposing definitions on terms from an adult perspective. Using this framework and the children's feedback during focus groups, children's terms amazed, cheerful, confused, cool, disgusted, excited, nervous, powerful, safe, scared, silly, thankful, tired, upset, and weird are suggested for use in subsequent testing with children. Ultimately, the words and emojis can be used to understand children's responses to products, and it is possible that some of these words and emojis may be more reflective of a general mood rather than a specific emotion response to a

stimulus. As such, it is recommended that future research with these terms include questions to ascertain whether words or emojis are being used by children to communicate a response in relation to the immediate experience with the product. In previous studies, researchers asked emotion questions at baseline and compared baseline responses to the emotion responses after product assessment to determine whether responses reflect a change in emotion after stimulus presentation (Bhumiratana *et al.* 2014).

One limitation of the emoji method is the difficulty in generating emojis from consumers, allowing little room for customization beyond the list provided. Although children were encouraged to draw their own faces to convey expressions not represented by the emojis provided, few children took this opportunity. Children who did draw faces produced images that were related to emojis provided, such as multiple happy faces to convey more happiness. Due to this challenge, the emoji tool generated through this research is limited to the options provided from Apple iOS 8.3. A variety of emoji styles are available online, such as Emoji One and Twitter's Twemojis, which may be useful in identifying additional face emojis that are relevant to children's experiences with food.

To develop an emotion tool for sensory research with children, there is value in continuing research with both words and emojis, because each approach meets different needs of different children. Words are helpful for children because they can provide a clear idea of the researchers' intentions and give the child confidence in their usage of the emotion word. On the other hand, emojis are more engaging and can capture emotions that children are unable to express in words. This research serves as a step forward in creating an emotion tool for children ages 8 to 11 that addresses some of the issues related to word-only approaches.

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Chapter 4 - Comparison of the use of emoji images to assess children's emotional responses to food images in the U.S. and Ghana

Abstract

Purpose

The purpose of this study was to investigate the relationship of children's use of emotion words and emojis in two countries where English is a primary language, but has different uses and histories of use.

Design/Methodology/Approach

Children's emotional responses to 8 food images (fresh spinach, baby carrots, orange juice, white grapes, cheddar cheese, chocolate graham snacks, lychee gummy candy, white bread) were collected in Kansas, USA and Accra, Ghana. In addition, children in both countries categorized emotion word and emoji valence (positive, negative, neutral, or "I don't know").

Findings

Overall, correlations were strongest between words and emojis characterized as negative. Ghanaian children were less likely to indicate that they didn't know the valence of a word or emoji than US children. The emotion words adventurous and cozy were categorized as positive more frequently by American children, while a higher percentage of Ghanaian children categorized calm as positive. The emojis expressionless face and confused face were perceived as negative by more Ghanaian children. Despite these differences, the majority of words and emojis had similar valence categorizations between the children in the USA and Ghana.

Originality/Value

This research addresses a need for a tool to use with children for assessment of emotion related to various foods. Additionally, the findings provide an original comparison of children's usage

of emotion words and emojis in response to foods in the USA and Ghana, both countries where English is a primary language, but is used differently on a daily basis by children.

Introduction

With the variety of choices consumers make every day, it often is not enough for researchers to understand liking alone. One way to more deeply understand consumers is through their emotional responses to products. This topic area has become popular in the sensory sciences, although these approaches generally have been developed and used with adults (Watson et al. 1988, King and Meiselman 2010, Spinelli et al. 2014). Children are an important global consumer group, so it is necessary to develop emotion methods for use with children. Initial research in our laboratories has shown that children are able to use emotion words and emojis to describe how foods make them feel and see the benefits of using both words and emoji images to capture these emotions in taste-testing (see Chapter 2 for further information).

As the food industry and sensory research continue to expand across the world, it is critical to develop methods appropriate for global use. This can be especially challenging in the case of emotion research, where language and cultural barriers may create problems in adapting written or verbal methods for international research. Emotions are complex, which has manifested itself simply in attempting to define what an emotion is (Scherer 2005). Emotion words can be culture-specific, making translation into other languages difficult. Despite these problems, several researchers have conducted research to understand the application of emotion tools across the globe. In an on-line survey of German speaking consumers in Germany, researchers found that an emotion method based on linguistic usage was more effective for

explaining differences between products than the EsSense Profile[TM], developed in the United States (Gmuer et al. 2015). In New Zealand, consumers were able to use the EsSense Profile in consumer testing, but certain terms were "odd" to participants for use with food, despite the shared language (Jaeger et al., 2013). Developed for global use, UniGEOS is an emotion tool resulting from research in 6 studies and uses 6 feeling categories that were common links across data sets. While this method is intended for use in multi-cultural emotion research, the authors caution that UniGEOS may be lacking in some of the more culturally-specific emotions, and the culture-specific version should be used if available (Ferdenzi et al. 2013).

To form an approach towards emotion testing with children, preliminary studies were conducted using focus groups in the United States and Ghana to understand children's emotion responses to foods, as well as their usage of words and emojis, small images which are popular on social media and text messaging platforms, to characterize these emotions. In that research, children saw benefits to both words and emojis – words were able to convey a clear meaning, while emojis allowed children to express emotions for which they did not have the vocabulary. Findings from those focus groups were used to develop questionnaires for further research.

The purpose of this study was to compare children's use of emoji images to assess emotion responses to visual food images in the U.S. and Ghana, two countries where English is a main language spoken by many children. However, in the US it often is the only language spoken and in Ghana other indigenous languages may be learned first and spoken at home, such as Akan (with the Twi dialect being most common), with English used some at home, commonly at school, and in government and public communication. Differences and similarities in emoji and emotion word use between the countries were compared.

Materials and Methods

Testing in the United States

Questionnaire Development

An initial list of words and emojis, provided in Figure 4.1, were identified through preliminary focus group testing. Emojis were obtained from Apple® iOS 8.3 (Apple, Inc., Cupertino, CA, USA, used with permission). The large number of words and emojis remaining after the initial focus groups and the variety of foods assessed in the present study would result in an unwieldy questionnaire using a rating approach for each combination, thus, a check-all-that-apply (CATA) approach, which works well in this case, was used. Similar simplification has been done in other cases where rating scales would result in a long, unwieldy questionnaire (Phan and Chambers, 2016). Children have been shown in cross-cultural studies to be able to use a CATA approach (Cardinal et al., 2015). Due to the number of words and emojis under consideration, photographs of food were evaluated to obtain initial feedback on emotions and identify words and emojis that may be eliminated, reducing the word and emoji set for future evaluation of tasted foods.

Food Images

Products for the study were selected to cover a range of food groups in an effort to provide different emotion experiences for participants. Fresh spinach was selected as a vegetable that would be less liked and likely elicit more negative emotions, while the researchers hypothesized that baby carrots would have higher liking among children, due to lower bitterness. White grapes were selected as fruit, while orange juice was selected to include a beverage. Cheddar cheese cubes were included as a dairy food. Classic white bread was selected as a common and well-liked grain product. Chocolate graham snacks were chosen to include a

Words		Emojis					

Words		Emojis
Active	Hope	
Adventurous	Interested	
Amazed	Joyful	
Anger	Loving	
Bad	Mild	
Bored	Nervous	
Calm	Peaceful	
Cheerful	Pleasant	
Confused	Pleased	
Cool	Powerful	
Cozy	Pride	
Daring	Quiet	
Desire	Relief	
Disappointed	Sad	
Disgusted	Safe	
Dissatisfied	Silly	
Eager	Satisfied	
Energetic	Surprised	
Enjoyment	Thankful	
Excited	Tired	
Fear	Ugly	
Free	Upset	
Friendly	Weird	
Glad	Wild	
Good	Worried	
Happy		

Emojis:
- Grinning Face
- Smiling Face With Smiling Eyes
- Smiling Face
- Winking Face
- Face Without Mouth
- Anguished Face
- Face With Open Mouth
- Smiling Face With Heart-Shaped Eyes
- Kissing Face With Closed Eyes
- Face With Stuck-Out Tongue and Winking Eye
- Face With Stuck-Out Tongue and Tightly-Closed Eyes
- Frowning Face With Open Mouth
- Face With Stuck-Out Tongue
- Flushed Face
- Pensive Face
- Relieved Face
- Unamused Face
- Worried Face
- Confused Face
- Expressionless Face
- Disappointed Face
- Persevering Face
- Crying Face
- Loudly Crying Face
- Sleeping Face
- Face Savouring Delicious Food
- Disappointed but Relieved Face
- Face With Open Mouth and Cold Sweat
- Tired Face
- Fearful Face
- Smiling Face With Sunglasses
- Grimacing Face
- Smiling Face With Open Mouth and Tightly-Closed Eyes
- Face Screaming in Fear
- Angry Face
- Pouting Face
- Face With Look of Triumph
- Confounded Face

FIGURE 4.1 WORDS AND EMOJIS USED IN U.S. FOOD IMAGE TESTING (™APPLE, INC., USED WITH PERMISSION)

product with a unique shape (bear) and chocolate flavor. Lychee gummy candies were included as an unfamiliar product to elicit any emotions associated with food neophobia, as food neophobia is often stronger among children and can be a barrier to trying new foods (Dovey et al. 2008).

All foods were photographed under fluorescent lighting using a Nikon D3100 Digital SLR Camera with a Nikkor 18-55mm f/3.5-5.6 VR Lens. All products were photographed without packaging, with the exception of the gummy candy. To provide the context that the lychee gummy candy is a foreign food, one unwrapped candy was photographed next to an unopened, individually wrapped candy. Three pieces each of fresh spinach, baby carrots, cheddar cheese, and chocolate graham snacks were photographed. Four white grapes were photographed on the stem. Two ounces of orange juice was photographed in a clear, 5-ounce plastic cup. A full, center slice of bread was photographed. All items were photographed against a white background.

Recruitment

Parents and legal guardians were contacted through the Sensory & Consumer Research Center database. A mix of children 7 to 11 years old (n=100) were recruited with a balance of males and females. To obtain data from children who had not previously completed testing with the emotion words and emojis used in the current study, children who had participated in previous focus groups about food and emotion were not eligible for this study. Because the study only involved looking at pictures of food, participants were not screened for allergies or willingness to eat the foods included the study.

TABLE 4.1 FOOD PRODUCTS PHOTOGRAPHED FOR IMAGE TESTING

Item	Producer	Package Size
Nabisco Honey Maid Teddy Grahams - Chocolate Flavor	Mondelez Global LLC, East Hanover, NJ 07936 USA	10 oz.
Kasugai Lychee Gummy Candy	Kasugai Seika Co., Ltd. 3-14, Nananoki 1-Chome Nishi-Ku, Nagoya, Japan	3.59 oz.
Wonder Classic White Calcium Fortified Enriched Bread	Flowers Bakeries, LLC Thomasville, GA 31757 USA	20 oz.
Kraft Natural Cheese Cubes Mild Cheddar Cheese	Kraft Foods Global, Inc. Northfield, IL 60093-2753 USA	6.4 oz.
Simply Orange Pulp Free 100% Pure Squeezed Pasteurized Orange Juice	Simply Orange Juice Company Apopka, FL 32703 USA	1.75 L
Muzzi Family Farms Organics Baby Spinach Pre-Washed	Muzzi Family Farms, Silinas, CA 93901 USA	1 lb.
Green Giant Fresh Baby Cut Carrots	Bolthouse Farms, Inc. Bakersfield, CA 93307 USA	32 oz.
Green Seedless Grapes PLU #4022 Product of Chile/Product of Peru	Distributed by Price Chopper	N/A

Fielding

All questionnaires were completed on iPad® devices using Compusense at-hand (Compusense Inc., Guelph, Ontario, Canada). A large, well-lit multi-purpose room was used for testing. Tables were arranged around the perimeter of the testing room with children facing the walls to avoid distractions. Prior to the start of the test, a moderator explained the testing process and provided the children with a brief description of the questions to familiarize children with the task. Servers were available in the testing room to provide assistance with reading and to answer questions during the study. Because no samples were served during this study, staff members wore regular clothes rather than lab coats to create a more comfortable and familiar environment for children. To keep the data as a reflection of children's reactions, staff were instructed to encourage children to use their best judgment in determining meaning of emotion words or emojis. Staff did not provide definitions of words or emojis if asked. Each station was set with an iPad® on a stand, a piece of scrap paper, and a golf pencil. Purified drinking water was available to children upon request.

As a warm-up for the testing, participants were first asked two open-ended questions to identify their favorite food and a disliked food. These responses were then used to introduce children to the emotion questions, where they were asked in a series of CATA questions to select words, followed by faces, to match how each of the foods made them feel. After the warm-up, children were asked how they felt at that moment, first with words, then with emojis. Within the emotion CATA questions, emoji presentation order was randomized for each child to minimize first-order effects. Due to the amount of words used, the researchers chose to present emotion words in alphabetical order for ease of use.

For each food image, children were asked to indicate whether or not they had ever tried the food, how much they liked the food based on the picture, and the emotion CATA questions,

using words, then emojis. All food images were presented in a balanced randomized design. Before each new food image, children saw a screen informing them of the next food they would see, providing a moment of transition between the questions. After the 3rd and 6th images, a timed, 1-minute break was enforced to allow children a moment of rest from testing activities. The break screen included Rebus word puzzles, designed for use with children and obtained from the National Institute of Environmental Health Sciences (2011). During the break, participants could work through the puzzle on scrap paper, or children were given the option, through on-screen and pre-test moderator instructions, to sit quietly. At the end of the break, solutions to the word puzzles were displayed, followed by a screen with the name of the next food to be seen.

After answering questions about all 8 food images, children were asked to sort words and then faces into positive, negative, neutral or so-so, or "I don't know". The questionnaire ended with demographic and questionnaire difficulty questions. All participants received monetary compensation for their participation. In most cases, the questionnaire took approximately 30 minutes to complete.

Preliminary Analysis – U.S. Data only

Emotion words and emojis were reviewed for frequency of use for all 8 images, as well as favorite and least favorite foods. Words and emojis used by fewer than 20% of children for all 10 questions were considered for elimination from further testing. In addition, valence responses were reviewed to determine consistency in children's categorizations. Words and emojis categorized as "I don't know" by more than 20% of participants were considered for elimination from further questionnaires.

Testing in Ghana

Recruitment

Primary schools in Accra, Ghana were contacted by a local collaborator to explain study procedures and schedule a time for fielding. Schools interested in participating were provided with a permission form detailing the study objectives, which were taken home and signed by the parents or legal guardians. To comply with the Institutional Review Board agreement with the University of Ghana, research was limited to children 12 years of age or older. To allow for comparison with the U.S. study and reduce developmental differences that may arise with age, only children 12 years of age were allowed to participate in the study. A total of 120 children completed the study.

Questionnaire

With limited or no internet in many of the schools selected for research in Ghana, the decision was made to create a paper ballot with the same structure as the Compusense at-hand questionnaire used in the United States. Results from the previous study were used to create a reduced set of 28 emotion words and 28 emojis. Ballots were printed double-sided in color and stapled in the U.S. Similar to the questionnaire in the U.S. research, children were asked liking and emotions of a favorite food, least favorite food or disliked food, and their present emotions. To provide a direct comparison to testing in the U.S., the same food images were used as samples. As with the U.S. questionnaire, food images were presented in a randomized and balanced design. Ballots were designed so that when the stapled packet was opened with pages side by side, only one food was displayed on the two visible pages. The timed break activity was removed from the Ghana ballot based on feedback from children in the U.S. study who found the task confusing and boring. Instead, a transition message indicating the next food was included

after the emoji CATA to prepare the child for the image on the next page. Emoji presentation was randomized by participant, with each child seeing the emojis in the same order for all CATA questions. After evaluation of the 8 food images, children were asked to rank the 8 foods they had seen and indicate whether or not they would be willing to try the food or drink if offered for a snack later in the day. This was followed by questions about emotion word and emoji valence, where children would check positive, negative, neutral, or "I don't know" for each item. The questionnaire concluded with questions about liking and difficulty of the survey.

Fielding

All data were collected in primary schools in Accra, Ghana. Fielding took place during a break in the schedule in an empty classroom or unoccupied library. Schools ranged from an air-conditioned international school to a local open-air school with dirt floors. Information about the schools and participants is available in Table 4.2. Prior to testing, children were asked to confirm their age with research staff and children 12 years old were permitted to continue with the study. A researcher provided a brief description of the questions that would be asked and all participants read and signed a consent form. Food images were captured in the U.S. and not exactly the same products were available in Ghana. In general, although the exact same product (e.g., spinach leaves) were not available in Ghana, a similar leafy green vegetable, *kontomire,* was available, making most of the products appropriate choices. However, realizing that some products may not be as familiar to all Ghanaian children and not all items are commonly available in Ghana, children were instructed to imagine how they would feel if given the food in the picture to try. Researchers were available throughout testing to answer questions, although they refrained from providing children with definitions of emotion words or emojis. Students and schools were compensated for their participation with school supplies.

TABLE 4.2 GHANA SCHOOL AND PARTICIPANT INFORMATION

School	Term Fees (Ghana Cedis)	Testing Location	Total Children	Male	Female	No Gender Information Provided
1	1300	Classroom	6	1	5	0
2	200	Classroom	21	9	10	2
3	11520	Classroom	19	7	9	3
4	100-500	Classroom	22	8	12	2
5	12000	Classroom	3	3	0	0
6	1075	Library	47	15	32	0

Data Collection

Data from paper ballots were entered by U.S. research staff on a questionnaire in Compusense at-hand, designed to mirror the formatting of the paper ballots. Researchers made note of missing and duplicate data points and these points were marked as incomplete data in the resulting data file. Two ballots were omitted from the final data set due to excessive incomplete information.

Analysis – US and Ghana

Correlations were calculated between word and emoji selections. Valence responses were reviewed to explore similarities and differences in children's understanding of words and emojis in the U.S. and children in Ghana. All analyses were conducted using XLSTAT (Addinsoft, Paris, France).

Tetrachoric correlation coefficients for binary CATA data were computed using XLSTAT's CATA data analysis, which uses a maximum likelihood estimation procedure.

Results

Reduction of the Emotion Set

Based on the criteria of use less than 20% across all foods, the words confused, daring, desire, disappointed, eager, fear, hope, interested, loving, mild, nervous, pride, quiet, relief, safe,

silly, surprised, tired, ugly, wild and worried were eliminated from further research. Among the emojis, Face With Open Mouth, Kissing Face With Closed Eyes, Face With Stuck-Out Tongue and Tightly-Closed Eyes, Pensive Face, and Sleeping Face were eliminated due to low usage. Emotion words dissatisfied, energetic, and weird also were eliminated because more than 20% of participants were unsure of the term's valence. Due to a coding error in the emoji valence step of the process, some emojis that may be of further interest in research with children were omitted from further testing. Face With Stuck-Out Tongue and Winking Eye (categorized as positive; used by >20% of respondents for favorite food, orange juice), Smiling Face With Open Mouth and Tightly-Closed Eyes (categorized as positive; used by >20% of respondents for favorite food), Disappointed Face (categorized as negative; used by >20% of respondents for disliked food), Anguished Face (categorized as negative-neutral; used by >20% of respondents for disliked food), and Face With Look of Triumph (categorized as negative, used by >20% of respondents for disliked food) were not included in the questionnaire used in Ghana and would require testing in future studies. Also impacted by this coding issue were Flushed Face and Face Without Mouth, which were marked on the valence question as "I don't know" by 37% and 35% of participants, respectively.

Emotion Word and Emoji Valence

Emotion words and emojis were sorted based on children's valence question responses. The categories with sorting criteria were as follows: positive (≥70% children sorted as "positive"), positive-neutral (sum of "positive" and "neutral" responses ≥70%), neutral (≥70% children sorted as "neutral"), negative-neutral (sum of "negative" and "neutral responses ≥70%), negative (≥70% children sorted as "negative"), unsure (≥20% children sorted as "I don't know"), and inconclusive (words or emojis not falling into above categories). The sorting results for the

words and emojis are provided in Tables 3.3, 3.4, 3.5, and 3.6, with the U.S. data in Tables 3.3 and 3.4 and the Ghana data in Tables 3.5 and 3.6.

In the U.S., children categorized many of the emotion words provided as positive, while the emojis skewed toward a negative interpretation. Children did not categorize words or emojis as "neutral" often, with only the emoji Sleeping Face categorized as "neutral" by more than 50% of participants. In addition, the positive-neutral words silly, pride, surprised and eager, along with negative-neutral terms fear, worried, nervous, tired were used infrequently in children's assessment of food, and were thus eliminated from further testing. While no emojis met the criteria for "positive-neutral", 13 emojis were categorized as "negative-neutral". Although several "negative-neutral" words were used infrequently, most of the "negative-neutral" emojis were used frequently enough for inclusion in the following study. Positive terms were more clearly categorized than negative words, with 10 of the words indicated as positive by more than 80% of children. A similar trend was observed with emojis.

While most valence categorizations of words and emojis were similar between U.S. and Ghana studies, some differences were observed. Ghanaian children's valence sorting of emotion words are provided in Table 5. As seen in the U.S., most emotion words fell into the categories "positive", "positive-neutral", "negative-neutral", and "negative", with no terms categorized as "neutral" by a majority of respondents. Among emotion words, the greatest differences were observed with the terms adventurous, cozy, and calm. Adventurous was categorized as positive in the U.S. with 70% of participants categorizing the term as positive, while in Ghana the word was positive-neutral (58% positive, 18% neutral). Calm was more positive to Ghanaian children (81% positive) compared to the U.S. children (55% positive, 28% neutral). Cozy was

TABLE 4.3 U.S. CHILDREN'S VALENCE CATEGORIZATIONS OF EMOTION WORDS

Positive		Positive-Neutral			Negative-Neutral			Negative	
	Positive		Positive	Neutral		Negative	Neutral		Negative
Happy	87%	Pleasant	67%	13%	*Fear*	*68%*	*17%*	Bad	80%
Glad	86%	Cozy	62%	23%	*Worried*	*61%*	*23%*	Disgusted	79%
Thankful	85%	Powerful	59%	21%	Bored	58%	27%	*Ugly*	*79%*
Enjoyment	84%	*Silly*	*59%*	*23%*	*Nervous*	*49%*	*30%*	Anger	78%
Loving	*84%*	*Pride*	*55%*	*16%*	*Tired*	*26%*	*47%*	Upset	77%
Friendly	83%	Calm	55%	28%				Disappointed	77%
Joyful	83%	*Surprised*	*52%*	*30%*				Sad	75%
Good	83%	*Eager*	*48%*	*22%*					
Cheerful	83%								
Excited	81%								
Amazed	78%								
Peaceful	75%								
Pleased	75%								
Hope	*74%*								
Active	73%								
Free	72%								
Safe	*70%*								
Satisfied	70%								
Adventurous	70%								
Cool	70%								

Unsure		Inconclusive				
	Unsure		Positive	Negative	Neutral	Unsure
Mild	*31%*	*Wild*	*28%*	*21%*	*35%*	*16%*
Confused	*29%*					
Daring	*25%*					
Desire	*25%*					
Quiet	*22%*					
Dissatisfied	*22%*					
Energetic	*22%*					
Weird	*21%*					
Interested	*21%*					
Relief	*21%*					

Italicized words were not included in the Ghana study.

TABLE 4.4 U.S. CHILDREN'S VALENCE CATEGORIZATIONS OF EMOJIS

Positive		Negative-Neutral			Negative	
	Positive		Negative	Neutral		Negative
		Disappointed but Relieved				
Grinning Face	92%	Face	69%	16%	Angry Face	83%
Smiling Face with Smiling Eyes	91%	Persevering Face	68%	11%	Pouting Face	82%
Smiling Face	86%	Worried Face	68%	19%	Tired Face	81%
		Face with Open Mouth and			*Face with Look of*	
Winking Face	85%	Cold Sweat	67%	16%	*Triumph*	*77%*
Face Savouring Delicious Food	83%	*Pensive Face*	*66%*	*16%*	Confounded Face	77%
Smiling Face with Heart-Shaped						
Eyes	82%	Fearful Face	62%	15%	*Disappointed Face*	*70%*
Relieved Face	82%	*Anguished Face*	*62%*	*20%*	Crying Face	70%
Smiling Face with Sunglasses	81%	Face Screaming in Fear	61%	15%	Loudly Crying Face	70%
Face with Stuck-Out Tongue	80%	Unamused Face	61%	16%		
Face with Stuck-Out Tongue and		Frowning Face with Open				
Winking Eye	*74%*	Mouth	59%	27%		
Smiling Face with Open Mouth and						
Tightly-Closed Eyes	*72%*	Confused Face	49%	34%		
		Grimacing Face	42%	35%		
		Expressionless Face	34%	44%		

Unsure		Inconclusive				
	Unsure		Positive	Negative	Neutral	Unsure
Flushed Face	37%	*Sleeping Face*	*17%*	*13%*	*52%*	*18%*
		Face with Stuck-Out Tongue				
Face Without Mouth	35%	*and Tightly-Closed Eyes*	*56%*	*20%*	*11%*	*13%*
Kissing Face with Closed Eyes	*23%*					
Face with Open Mouth	*22%*					

Emojis with Italicized names were not included in the Ghana Study. (Note no emojis were positive-neutral)

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categorized as positive-neutral in the U.S. (62% positive, 23% neutral). In Ghana, categorization of cozy was inconclusive, with 45% categorizing as positive, 20% negative, and 21% neutral. Considering the elimination criteria used in the U.S. study, adventurous, cozy, and powerful were used by fewer than 20% of participants for all study foods.

Table 4.6 contains a summary of the emoji valence sorting by children in Ghana. As with emotion words, most emojis fell into the same valence categorizations in the U.S. and Ghana ("positive", "negative-neutral", "negative"). When using emojis, Ghanaian children had stronger negative categorizations of the following emojis, which were categorized as negative-neutral by U.S. children: Disappointed but Relieved Face, Persevering Face, Face With Open Mouth and Cold Sweat, and Fearful Face. Although categorized as negative-neutral in both countries, Expressionless Face was more negative in Ghana (54% negative, 25% neutral) compared to the U.S. (34% negative, 44% neutral). Similarly, Confused Face was more negative in Ghana (68% negative, 20% neutral) compared to the U.S. (49% negative, 34% neutral). Children in both countries struggled to categorize Face Without Mouth, with 35% of American and 21% of Ghanaian participants not knowing how to categorize the emoji valence. Several emojis were used infrequently in Ghana, with the following used by less than 20% of respondents for all foods: Fearful Face, Grimacing Face, Flushed Face, Face Without Mouth, Expressionless Face, Loudly Crying Face, and Face Screaming in Fear.

Overall, Ghanaian children used "I don't know" less frequently when sorting words and emojis than American children. This may be because the Ghanaian children were older than the American participants, and thus had a larger vocabulary and were more confident in their choices as compared to their American counterparts. Another factor is the number of emotion words and emojis seen by the participants, with American children seeing longer lists of both words and

TABLE 4.5 GHANA EMOTION WORD VALENCE CATEGORIZATIONS

Positive				Positive-Neutral			Negative-Neutral			Negative	
Positive		Positive			Positive	Neutral		Negative	Neutral		Negative
Good	96%	Cool	86%	*Powerful*	*65%*	*13%*	Upset	69%	10%	Anger	88%
Happy	96%	Active	86%	*Adventurous*	*58%*	*18%*	Bored	58%	24%	Bad	87%
Cheerful	95%	Free	85%							Sad	82%
Enjoyment	93%	Peaceful	84%							Disappointed	80%
Joyful	92%	Pleased	83%							Disgusted	75%
Glad	92%	Amazed	82%								
Excited	90%	Pleasant	81%								
Thankful	89%	Calm	81%								
Friendly	88%	Satisfied	75%								

Inconclusive				
	Positive	Negative	Neutral	Unsure
Cozy	*45%*	*20%*	*21%*	*15%*

Italicized words were used by fewer than 20% of children for all foods.

TABLE 4.6 GHANA EMOJI VALENCE CATEGORIZATIONS

Positive		Negative-Neutral			Negative	
	Positive		Negative	Neutral		Negative
Grinning Face	95%	Unamused Face	68%	20%	Angry Face	89%
Face Savouring Delicious Food	94%	Confused Face	63%	22%	Pouting Face	85%
Smiling Face with Smiling Eyes	89%	Worried Face	68%	15%	Crying Face	82%
Smiling Face with Heart-Shaped Eyes	87%	*Face Screaming in Fear*	*57%*	*25%*	Tired Face	82%
Smiling Face with Sunglasses	87%	*Expressionless Face*	*54%*	*25%*	Persevering Face	82%
Smiling Face	86%	Frowning Face with Open Mouth	59%	19%	Confounded Face	80%
Winking Face	85%	*Flushed Face*	*38%*	*35%*	Disappointed but Relieved Face	80%
Face with Stuck-Out Tongue	75%				Face with Open Mouth and Cold Sweat	79%
Relieved Face	73%				*Loudly Crying Face*	*76%*
					Fearful Face	*70%*

Unsure		Inconclusive				
	Unsure		Positive	Negative	Neutral	Unsure
Face Without Mouth	*21%*	*Grimacing Face*	*24%*	*45%*	*20%*	*10%*

Italicized emojis were used by fewer than 20% of children for all foods.

emojis throughout testing. The larger number of response options may have induced more respondent fatigue, resulting in increased "I don't know" responses among American children.

Emotion Word and Emoji Correlation

Table 4.7 contains a summary of high correlations (≥0.70) in the U.S. data between emotion words and emojis used in response to food images. There are cases of high correlation between positive emojis and positive words and between negative-neutral or negative emojis and negative-neutral, negative, or unsure words. There were no strong negative correlations (≤-0.70), meaning that no positive terms (emoji) correlated with a negative emoji (term) in the U.S. data. Overall, correlations were highest between negative and negative-neutral words and emojis.

As observed in the U.S. data, correlations between words and emojis from the Ghana data were strongest among negative and negative-neutral words and emojis. Loudly Crying Face had high correlations with emotion words sad, disappointed, and anger in both U.S. and Ghana data sets. Worried Face, a negative-neutral emoji in both studies, was strongly correlated with use of the word sad for Ghanaian and American respondents. The emojis most strongly categorized as negative in both countries, Angry Face and Pouting Face, were highly correlated with the words upset, anger and bad. These emojis also had strong negative correlations (≤ -0.70) with positive words such as thankful and peaceful in the Ghana study. Tired Face was only highly correlated with the eliminated term ugly in the U.S. data, but had strong positive correlations with upset, disgusted, disappointed, sad, bad and anger in Ghana.

TABLE 4.7 U.S. EMOTION WORDS AND EMOJIS WITH HIGH CORRELATIONS (≥0.70) SORTED BY U.S. CHILDREN'S VALENCE CATEGORIZATION

		Positive Words					
		Happy	Enjoyment	Loving	Joyful	Good	Cool
Positive Emojis	Grinning Face	0.74				0.74	
	Smiling Face With Heart-Shaped Eyes			0.73			
	Smiling Face With Sunglasses		0.73				0.74
	Smiling Face with Open Mouth and Tightly-Closed Eyes				0.70		

		Negative Words					
		Sad	Disappointed	Upset	Anger	Ugly	Disgusted
Negative-Neutral Emojis	Fearful Face		0.71				
	Face With Open Mouth and Cold Sweat	0.70		0.78		0.71	0.71
	Worried Face	0.72					
	Persevering Face	0.70					
	Disappointed but Relieved Face	0.75	0.70				

		Negative-Neutral	Negative Words							Unsure	
		Worried	Sad	Disappointed	Upset	Anger	Ugly	Disgusted	Bad	Dissatisfied	Weird
Negative Emojis	Crying Face		0.77				0.73				0.71
	Loudly Crying Face	0.72	0.79	0.70	0.77		0.75		0.71		
	Disappointed Face			0.76				0.70	0.70	0.74	
	Tired Face						0.71				
	Pouting Face		0.71		0.78	0.81	0.72		0.75		
	Angry Face				0.70	0.70	0.79		0.75		

TABLE 4.8 GHANA EMOTION WORDS AND EMOJIS WITH HIGH CORRELATIONS (≥0.70) SORTED BY GHANAIAN CHILDREN'S VALENCE CATEGORIZATION

		Positive Words					
		Happy	Cheerful	Joyful	Glad	Excited	Friendly
Positive Emojis	Grinning Face	0.75		0.70			0.70
	Smiling Face With Smiling Eyes						0.73
	Smiling Face With Heart-Shaped Eyes			0.71			
	Smiling Face With Sunglasses			0.73			0.70
	Winking Face	0.72	0.70	0.74	0.71	0.73	0.73

		Negative-Neutral		Negative Words			
		Upset	Disgusted	Disappointed	Sad	Bad	Anger
	Fearful Face				0.70		
	Loudly Crying Face			0.73	0.80	0.78	0.70
Negative Emojis	Face With Open Mouth and Cold Sweat	0.75			0.84	0.74	0.75
	Disappointed but Relieved Face	0.81	0.70	0.75	0.86	0.72	0.72
	Confounded Face	0.73	0.79	0.73	0.70		
	Persevering Face	0.71	0.81	0.75	0.72		
	Tired Face	0.82	0.75	0.82	0.79	0.83	0.73
	Crying Face	0.75		0.71	0.79	0.73	0.76
	Pouting Face	0.76		0.75	0.77	0.83	0.85
	Angry Face	0.82	0.75	0.83	0.80	0.71	0.81

		Negative Word	
		Sad	
Negative-Neutral Emoji	Worried Face	0.75	

TABLE 4.9 GHANA EMOTION WORDS AND EMOJIS WITH STRONG NEGATIVE CORRELATIONS (≤ -0.70) SORTED BY GHANAIAN CHILDREN'S VALENCE CATEGORIZATION

		Positive Words													
		Good	Happy	Cheerful	Enjoyment	Joyful	Glad	Thankful	Cool	Active	Peaceful	Pleased	Amazed	Pleasant	Calm	Satisfied
Negative Emojis	Fearful Face	-0.89									-0.84					-0.86
	Face With Open Mouth and Cold Sweat				-0.88			-0.85								
	Disappointed but Relieved Face				-0.88							-0.88				
	Persevering Face															
	Tired Face		-0.91		-0.90			-0.87								
	Crying Face				-0.88											-0.87
	Pouting Face		-0.91	-0.90		-0.90	-0.90	-0.87	-0.91	-0.90	-0.87	-0.89	-0.87	-0.89	-0.89	-0.89
	Angry Face							-0.86			-0.86					

		Positive-Neutral Words						Negative Words	
		Powerful	Adventurous					Disappointed	Anger
Negative Emojis	Persevering Face		-0.85		Positive Emojis	Grinning Face		-0.93	
	Crying Face	-0.83				Face Savouring Delicious Food			-0.91
	Pouting Face	-0.85				Smiling Face With Sunglasses			-0.89
						Winking Face			-0.89

Discussion

In comparing children's usage of words and emojis to evaluate images of food in the U.S. and Ghana, children showed similar use of words and emojis. While the broader valence categories used by children were the same for most emotion words and emojis, some differences in the distribution of positive, negative, or neutral responses were observed. This may be reflective of cultural nuances in children's interpretations of the words and emojis used in this study. While the broad categories may be helpful in understanding differences among a range of foods, such as those photographed for this study, the nuances may become more important when looking within a closely related set of test samples or when foods actually are eaten. As cautioned by Ferdenzi et al. (2013), the culture-specific differences in emotions may become important in differentiating similar products, so researchers studying variations of a product would benefit from further understanding the finer differences in emotion among cultures. Ramaroson Rakotosamimanana, et al. (2015) found that culture, not language, was the more important differentiator in terminology for consumers describing differences among products.

Correlations were strongest between words and emojis categorized as negative, although both American and Ghanaian children used positive terms most frequently throughout the study. Several words and emojis in the U.S data set were used infrequently and not tested in the Ghana data set and some additional terms were used by fewer than 20% of respondents in Ghana, additional testing with those terms is needed before they can be eliminated from all further studies. These words and emojis may still be useful in food research with children in other situations and in other cultures; a single study is insufficient evidence to eliminate options from further testing. While foods in this study were familiar to many of the children in the U.S., several of the foods were less familiar to children in Ghana. As a result, children may not have

used words and emojis that they would otherwise use to explain their feelings in response to local foods. Pre-testing with relevant children to identify product-relevant words and emojis is recommended prior to conducting product testing.

One limitation of the present research is the use of food images, rather than actual foods. This decision was made to obtain insights prior to method reduction and to allow for testing in schools in Africa, but these results may not be reflective of what would be observed in a study with samples. Cardello et al. (2012) observed stronger responses to food names for highly emotional foods. Additionally, food names tended to result in reports of positive emotions, as was observed in our research. Further research with actual foods will be necessary to understand children's responses to foods, as compared to food images.

Another limitation is the ages of the participants. While this research has focused on children age 7-12, there may be potential to expand beyond this population. Emojis in particular may be of use in understanding emotion responses of younger children who do not have the vocabulary to provide feedback using a verbal technique. Further research is needed to understand if a younger population can understand the task of selecting emojis that reflect their emotion responses to foods. Additionally, this study only looked at cultural differences in emoji usage, not major language effects because English is commonly spoken by children in Ghana even though tribal languages also are used. Thus, a population that is not English speaking is suggested for future research to further explore whether emojis can help in avoiding the pitfalls associated with translating verbal approaches to other languages to measure emotion.

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Chapter 5 - Cross-Country Research with Kids: Observations & Learnings

Abstract

Consumer research studies across multiple countries frequently are found in published literature, but studies with children across countries are not as available. As part of a larger project, quantitative testing with children ages 7-12 was conducted in the United States and Ghana. Although effort was made to maintain consistency in the recruitment of participants and data collection between the two countries, many variables emerged. The objective of this report is to identify those differences in an effort to make researchers aware of the adaptability needed when conducting cross-country research with children. Variables compared between countries include facilities, samples, data collection, session scheduling, duration of fielding, recruitment, and compensation. In addition, although all arrangements may be confirmed before testing begins, adaptability "in country" will be highlighted because unexpected issues may arise that require immediate changes in protocols. Although there were many differences between the countries in protocols, the differences were minimized to the extent possible and the results were similar. Having an in-country partner for consumer studies with children is highly recommended to be prepared for variability and to identify adaptations needed, particularly where cultural norms, laws, facilities, and expectations may vary widely from those in the researcher's home country.

Keywords: kids, cross-cultural, multi-country

Introduction

Globalization has been an important force in the food industry and research, making it necessary for food professionals to consider problems within a global context. To understand a range of consumers and their needs across cultures, sensory research has become increasingly global in recent decades. Even when cultures share a language, important differences may be observed through sensory testing. A recent study among bilingual consumers suggests that culture, rather than language, plays a key role in differences that often are observed in cross-cultural sensory studies (Ramaroson Rakotosamimanana, Arvisenet & Valentin, 2015). Similarly, Antmann et al. (2011) observed differences in creaminess perception among consumers from Argentina, Spain, and Uruguay, despite their shared language. Comparing results from beverage testing conducted with English-, Portuguese- and Spanish-speaking consumers, van Zyl and Meiselman (2016) concluded that culture differences impact usage of emotion words and should therefore be considered when developing an emotion tool for cross-cultural use.

Although international sensory research is important, many published sensory studies focus on subjects in North American, European, or Asian cultures. African cultures are less represented in consumer research, but countries such as Ghana represent emerging markets with a young and growing population. As of the 2010 Census, Ghana's population was 24.7 million, a 30.4% increase over the 2000 Census findings, with 38.3% of the population under 15 years old (Ghana Statistical Service, 2012). At this same time, the United States population grew only 9.7% from 2000 to 2010 and less than a quarter of the population was under 18 years old (Howden & Meyer, 2010). Furthermore, foods and beverages account for a larger portion of household spending in Ghana than is often observed in higher income markets. On average, half

of household consumption in Ghana in 2010 was attributed to foods and beverages (The World Bank Group, 2016).

In addition to limited sensory research within African markets, there is little multi-country sensory research with children. Research with children and international research each present challenges that require careful consideration. Each requires the researcher to make decisions about what is possible and what is necessary in order to obtain meaningful results. For example, research recently published comparing results of children and adults in the US. Argentina, and Spain had to exclude children in the US because some of the samples included an ingredient that is not approved for the U.S., and the institutional review board in the US would only approve testing for adults and not children (Cardinal et al, 2015). Sensory research with children requires the consideration of children's developmental level in the planning and design of experiments (Popper & Kroll, 2005). Researchers conducting testing across cultures must understand the role of cultural differences that may impact research planning, such as customs, literacy, and etiquette (Goldman, 2006). The combination of these two can provide a unique set of obstacles that require adaptability on the part of the researcher, both in planning and while fielding.

The following paper details some of the challenges that were faced, alterations that were made, and suggestions for other researchers for the planning and execution of international research. A summary of these considerations is provided in Table 5.1. While the list of considerations is not intended to be exhaustive, it serves as a practical example, against which researchers may consider their own international research objectives and plans. Studies were conducted in the United States and Ghana to understand children's emotion responses to images

of foods using emojis (cartoon images of faces commonly used in mobile and internet communications) and emotion words.

TABLE 5.1 LIST OF CONSIDERATIONS FROM THIS STUDY FOR CROSS-CULTURAL TESTING WITH CHILDREN

	Were adjustments made for testing in Ghana?
Recruitment	
Form of Participant Contact	Yes
Timing of Recruitment	Yes
Screening Method	Yes
Child Assent	No
Parent Consent	No
Participants	
Age	Yes
Gender	No
Number of Participants	No
Type of Compensation	Yes
Fielding	
Samples Evaluated	Yes
Time of Day	Yes
Length of Sessions	Yes
Overall Time to Collect Data	Yes
Research Staff Responsibilities	Yes
Study Supplies	Yes
Testing Room Layout	Yes
Location Type	Yes
Data Collection	
Physical Form of Ballot	Yes
Ballot Language	No
Questions Asked	No
Sample Design	No
Question Design	No
Post-Study Data Handling	Yes

Research Outline

Three studies were conducted as part of a larger research project to understand the emotions children experience in response to foods. The first study was a central location test conducted on the Kansas State University – Olathe Campus (Olathe, Kansas, USA) where 100 children evaluated images of food. The second test, held at the same location, involved 111 children evaluating actual food products. The final test was conducted across 6 primary schools in Accra, Ghana, where 120 children evaluated images of food. The following sections detail the differences in procedures and the adaptations that were made prior to arrival in Ghana, while in Ghana, and after returning to the U.S.

Adaptations Prior to Arrival in Ghana

Samples

Before conducting research in Ghana, two tests were fielded in the United States: 1) a test with 8 food images (fresh spinach, baby carrots, orange juice, white grapes, cheddar cheese, chocolate graham snacks, lychee gummy candy, white bread) to reduce the set of words and emoji responses used for further testing with children, and 2) a second test with children evaluating tasted samples of the same foods shown in the image study.

For testing in Ghana, the original plan was to replicate the second U.S. study with Ghanaian children tasting 6 of the foods and reporting emotion responses to these samples. During recruitment inquiries to schools, a local collaborator communicated these plans to school administrators, but few schools expressed interest in participating in the research. This disinterest was unexpected, as several schools had expressed interest in the project after focus groups related to this research were held with children in Accra three months prior. After several schools declined to participate or failed to respond to the request, the local researcher probed to

understand the hesitation of school staff and learned that there were concerns about conducting tests with foods in schools due to student food allergies. Based on this feedback, the decision was made to conduct a test similar to the second test, but with the 8 food images used in the first study held in the U.S.

Recruitment

At the research center in the U.S., a database of consumers is maintained for study recruitment in the Kansas City metro region. Through this database, parents and legal guardians of children were contacted via email for internet screening using Compusense at-hand (Compusense Inc., Guelph, Ontario, Canada). For both studies in the U.S., recruitment began approximately one week prior to fielding. Children recruited for these studies ranged from 7 to 11 years old. Parents of qualified participants received confirmations and reminders of their appointments by email, through the Compusense at-hand scheduling system. Written parent consent and child assent were also obtained on the day of the study.

In Ghana, a local partner contacted primary schools in Accra to assess interest assisting with the research project. To adhere with the Institutional Review Board agreement for the research in Ghana, children under 12 years old were not allowed to participate in this study. Prior to fielding, researchers made the decision to limit participation to children 12 years old to minimize age differences between the groups of children. Similar to the U.S. image study, children were not screened for food allergies or dietary restrictions since children were only evaluating pictures of foods during the study. No central facility to conduct testing with more than 100 children was available, so the decision was made to bring testing into the schools. Contact with the schools was made through the principal, and in several cases required multiple phone calls or visits to the school to confirm that the school was willing to participate in the

study. Once the school agreed to participate in the study, permission forms were provided to the school and sent home with children to provide parent consent for study participation. Children's written assent was also obtained on the day of the study. Schools provided researchers with an estimate of the number of children that they anticipated would participate in the study. Students were screened by the in country partner at the school site on the day of testing.

Data Collection

In the U.S. all results were collected using Compusense at-hand, which allows the researcher to use designs to rotate appearance of samples and response choices. Questions can also be constructed so that the respondent must make a choice before continuing through the rest of the test. Collecting data in this way allowed for minimal missing data in the U.S. dataset and eliminated the risk of human error during manual data entry.

With limited or no internet in some schools where fielding occurred in Ghana, a paper ballot was used for data collection. English is the official language of Ghana and used in school, thus, ballots were not translated. Prior to arrival in Ghana, a researcher created a version of the questionnaire previously made in Compusense using a word processor. A draft of this questionnaire was reviewed by researchers in the U.S. and Ghana to assess clarity of the testing method once adapted to paper. After agreeing on a final version of the questionnaire, 120 unique questionnaires were constructed to include a randomly balanced presentation of the 8 sample images, as well as randomized presentation of the emojis in the CATA questions. All ballots were printed in color in the United States prior to the study and transported to Ghana by the researchers.

Adaptations in Ghana

Compensation

For all studies in the United States, children were compensated in cash for their participation in the study. For Ghana, researchers worked with the local collaborator to identify appropriate compensation for the children and the schools. Children were each given a notebook, pencil, and eraser for their participation. The pencils and erasers were handed out with the questionnaire so that children could use those items to fill in their responses. Each school received pens, pencil, and a calendar for their efforts.

Scheduling and Location

In the U.S., the study dates were selected to maximize child availability, such as half-days or holidays in the local school systems. All sessions were conducted at the Sensory & Consumer Research Center at Kansas State University – Olathe. Study times were established by research staff during times when local school children would be available. Parents of qualified children were allowed to select the session that best fit their child's schedule. Each session lasted 1 hour, although most children completed the study within 30 minutes. Both studies in the U.S. were completed in a single day of testing.

In Ghana, all research was conducted in the primary school during school hours to ensure child availability. The time of day was determined by school staff to align with break periods for 12-year-old students. Although times had been discussed between a researcher and the school staff prior to the study, several appointments did not start at the scheduled time because the children were not yet available to complete the survey. To accommodate multiple schools, study sessions were spaced out over the course of four days. Including travel throughout the city and fielding, researchers spent approximately 4 to 5 hours each day dedicated to fielding this research project.

Facilities

Testing in Olathe, Kansas, USA was conducted in a large multipurpose room, with tables arranged along the perimeter of the room. Each participant station faced the wall and contained an iPad® equipped with Compusense at-hand for data collection. Seating outside of the study room was provided for parents and siblings while they waited on-site for their child to complete the study.

Six different primary schools were used for study fielding in Ghana, each with different facilities for testing. The differences at each location made it necessary for the researchers to discuss their set-up plan at each school after seeing which room was provided for testing. At each site, researchers had 5 to 10 minutes before fielding to set-up the space in preparation for testing. The schools in Ghana varied from an air-conditioned international school, to an open-air local school with dirt flooring. In the latter school, children sat at chairs with wood slabs that served as their desk. There were not enough wood pieces for all the desks in the study classroom, and several children at this location had to take the time to retrieve pieces of wood from elsewhere in the school. The rooms at this school did not have doors, which introduced distractions from peers who were not eligible to participate in the study, but were interested in observing. A researcher and a teacher helped to keep participants on-task and to stop other students from interfering with the research activities. At another school, a library was used for fielding the study. Rather than the individual desks used in many of the classrooms, children in the library had to sit around large tables where they were able to face other students. To minimize distractions and avoid bias from other participants, two researchers circled the room and when necessary reminded students to maintain focus on the study tasks. Students who needed reminding to focus on the task often took longer to complete the survey than other

children, and as a result fielding the study with a larger group of students or with possible distractions took longer than fielding at schools with fewer participants.

Number of Participants

In the United States, recruitment was capped at 120 participants for each study, with the goal of collecting data from 100 children per study. After participant cancellations and no-shows, 100 children participated in the first U.S. study with food images, while 111 children participated in the study with food samples.

In Ghana, 120 children who consented to participating in the study and were 12 years of age participated in the study. At least two children eligible to participate in Ghana opted out of the study after ballots were passed out and study instructions were given by the moderator. A possible reason for this may be the length of the ballot, which is readily apparent when using a printed questionnaire versus a computer-based questionnaire with no progress indicator. Although schools provided estimates of the number of children participating in the study, the actual number of children available for testing varied on the day of fielding. Throughout the week of testing, researchers monitored participation levels and discussed plans to ensure the goal of 100 participants was reached. The final school provided the researchers with an opportunity to collect data from more than 120 children, but there was not adequate time prior to this session to allow for the design and color printing of additional ballots. As a result, 6 children from this school were selected to participate, resulting in a total of 120 participants across all 6 schools in Ghana.

Adaptations after Returning to the United States

Data Handling

In the U.S., all responses were recorded by participants using an iPad® equipped with Compusense at-hand. Children used anonymous usernames provided by study staff so that responses could not be linked to the child's identity.

All paper ballots were transported from Ghana by a researcher and data from paper ballots were entered by two technicians in the U.S. Due to the length of the questionnaire, an identical version of the paper questionnaire was designed in Compusense-at hand to simplify data entry. The designs used to create the randomizations of food images and emojis were included in the web-based questionnaire so that the questions displayed matched the printed format of the completed questionnaires. Prior to data entry, the researchers agreed on how to handle missing or duplicate responses to that questionnaire input was consistent. While entering data, each researcher kept notes on missing or duplicate data, and these notes were used to mark these data points as incomplete in the resulting data file. The researchers agreed to omit 2 ballots from inclusion in the data set because of excessive incomplete data.

Discussion

While the data from this research showed similar usage of emotion words and emojis between the countries, the research plans were quite different between the two locations. The first change made in the initial planning of the study was the change from actual food samples to food images. While the intention was to collect data in Ghana using samples of food, feedback from school administrators revealed a need to revise this approach. This change led to a longer ballot to include food images and did not allow for collection of children's responses to tasted foods, however this freed up researchers on-site in Ghana to manage testing without sample preparation. Additionally, this change allowed for the evaluation of 8 images rather than 6 food samples. In initial planning discussions with a local collaborator, the number of food samples to

be served was reduced from 8 in the U.S. study to 6 food samples in Ghana to account for time needed for the serving and evaluation of foods. Once the choice was made to use images, the plans were revised to include all 8 images used in the first U.S. study.

Another major change to the study was the use of paper ballots versus an online questionnaire. Working with a local collaborator was key in understanding the challenges of conducting testing online, such as limited or no internet access and fluctuations in the availability of electricity. These conversations made it clear early in planning that moving forward with a web-based questionnaire was unrealistic for in-school testing in Ghana. Although the availability of electricity was not an issue during the actual conduct of this study (data could be stored on the local device), power outages were a factor in focus groups conducted for an earlier part of the larger research project. Additionally, the lack of appropriate internet access reduced the ability to download and upload actual data and ballots as needed to the tablet devices, which limited their use from a practical standpoint. Lost data would have been disastrous; thus, paper was employed to ensure data was not lost.

With the number of food images, emotion words, emojis and questions included in the survey, constructing organized ballots with balanced presentation was a more time-consuming task in a word processor as opposed to using a web-based survey tool. While Compusense at-hand will generate a pdf of the questionnaire, the program does not generate individual ballots containing the design for each panelist, so the ballots were created by a researcher. This required careful advance planning on behalf of the researchers prior to fielding in Ghana. It also made collecting additional data much more complicated than adding another participant to an online test. If possible, pre-testing is recommended to determine which elements of questionnaire design are necessary to preserve when adapting to a paper approach, and which elements do not

impact the study results. For example, had previous results shown that emoji order did not impact the results of this study, a standard order of emojis could be established, greatly reducing the time needed to create paper ballots.

In addition to the time needed for creation, the printed questionnaire presented additional challenges while in Ghana. While a visual representation of the length was not provided for children in the U.S. completing the online questionnaire, in Ghana the length of the task was obvious due to the physical size of the ballot, which was 12 double-sided pages. The amount of pages may have negatively impacted some children's willingness to participate in the study, with at least 2 students in Ghana declining to participate after seeing the questionnaire. The length of the paper ballot also made it difficult to check for missing data within the time constraints of testing, while the online questionnaire used in the U.S. did not allow children to proceed if a response was missing. Although children in Ghana were reminded to provide a response for each question, several ballots contained missing data points.

While conducting research in Ghana provided a number of challenges, particularly in terms of researcher time needed for study execution, throughout fielding, the school staff and students helped to make the study run smoothly. At multiple schools, staff assisted in locating an appropriate space for the study and helped researchers identify 12 year olds for participation in the study. In the open-air school, a school staff member remained present throughout fielding to help manage children who were not participating in the hallway and keep students participating focused on completing the study. Although 2 children opted out of participating in the study, the majority of students were interested in participating in the study and were happy to make a contribution to the research.

Consumer testing in other countries is an important endeavor, but it comes with complications. Ideally, many of the issues that arise in such research could be circumvented with ample time, space, resources, and qualified participants, but such luxury is not always available. While sensory researchers aim to conduct carefully controlled studies with minimal variation, unanticipated variables may arise when researching in an emerging market. These variables present challenges for the researchers, but should not hinder scientists from conducting research in international locations. Establishing a relationship with a local research collaborator and consulting with them throughout the planning and execution of the study can help foreign researchers understand the environment and approaches that are most appropriate for meeting study objectives in an unfamiliar setting.

Acknowledgements

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Chapter 6 - Comparing Visual Food Images vs. Actual Food When Measuring Emotional Response of Children

Abstract

With the continued growth of emotion research in the consumer sciences, it has become necessary to investigate approaches which are appropriate for use with children. The purpose of this study was to compare children's liking and emotional responses to food images and actual foods. In both studies, 8 foods were used as stimuli (fresh spinach, baby carrots, orange juice, white grapes, cheddar cheese, chocolate graham snacks, lychee gummy candy, white bread). In the first study, children answered questions about liking and emotions in response to food images. Emotion responses were collected using a check-all-that-apply format with emojis and words as variables. In the second study, children were asked liking and emotion questions after seeing the sample and after tasting the sample. Overall liking scores were higher for actual foods compared to food images. Additionally, testing with actual foods resulted in increased use of positive emojis and words, and decreased use of negative emojis and words for both food appearance and post-taste emotions. The largest differences in liking and emotion results were seen in response to the lychee gummy candy, which most children had not tried before. The children's responses differed between a conceptual evaluation (image) versus actual evaluation (image, taste).

Practical Applications

This study illustrates the influence of stimulus type on study outcomes when testing with children. In this study, the children's responses differed between a conceptual evaluation (image

only) versus literally seeing and tasting the product, are therefore and are not interchangeable when conducting emotion testing with children.

Keywords

Emotion, children, food, emojis

Introduction

Children are an important consumer group with a role in food decisions. The family structure has shifted recently, so that today's children have more influence in family decisions (Mintel 2016). Therefore, it is important for researchers to engage children as consumers and understand their responses to products. As study participants, children are different from adults, and testing with children requires that the researcher makes adjustments to meet the needs and the abilities of these respondents. Fielding a taste test with children requires consideration of the parent or guardian, as well as the child, in determining study needs, such as appropriate timing and facility set-up (Guinard 2001). Once on site, children must remain engaged in the activity, and keeping children behaved and paying attention to the task at hand requires careful consideration in research planning. Since children are under the age of consent, children are also afforded additional protections as research subjects, which may limit the types of research that can be conducted with a child population. In a multi-country study, researchers conducted testing with children for fruit-flavored juices in Argentina and Spain, but were unable to conduct testing with children in the United States because some of the products contained ingredients banned in the U.S.A., although approval was granted for testing with U.S. adults (Cardinal *et al.* 2015). To alleviate some of the issues associated with consumer testing with children, researchers may decide to simplify the testing approach, taking approaches such as using pictures of food when products are visually different.

Olsen *et al.* (2012) had success in using a picture-based approach with children in the evaluation of buns and juices. With schoolchildren as test subjects, a conjoint approach was used to gather responses to bun and juice products, and results from this study were compared to hedonic and choice responses in a subsequent taste test. Findings from a study of tasted foods aligned well with the computer-based image responses to the products, suggesting this image approach could be a quick and easy alternative to on-site testing.

Context is an important element to consider in study planning, and has been the subject of a range of sensory studies. Several researchers have reported an impact of location of testing on study results. Acceptability ratings of the same dish evaluated in several locations, including an elderly day care center and a 4-star restaurant in a hotel, were significantly impacted by the evaluation location (Edwards *et al.* 2003). Boutrolle *et al.* (2005) compared central location test (CLT) and home-use test (HUT) results and found that CLT results were more robust. While overall conclusions were the same between the CLT and HUT studies, liking scores were lower in the CLT. Researchers have also considered alterations of context within a laboratory setting to compare realistic versus controlled study designs. In a comparison of Army field results versus sensory laboratory results, offering participants a choice in the laboratory, and thus providing a more realistic condition for food consumption, improved the correlation between laboratory and field results (de Graaf *et al.* 2005). Testing of tea products with different levels of experimental control over additions (milk, sugar) resulted in differences in product discrimination and correlation to HUT results (Posri and Macfie 2008).

In designing testing for the assessment of emotions, it is necessary to consider the potential influence of contextual factors on reported emotions. When comparing blind assessment and brand-informed assessment of chocolate hazelnut spreads, researchers found that

although emotions discriminated the products well in both cases, discrimination of emotions was better in the informed condition (Spinelli *et al.* 2015). Additionally, emotions reported were impacted by whether or not the tasted product aligned with expectations based on a photograph of the branded package. Piqueras-Fiszman and Jaeger (2014) showed that evoked emotion contexts impact consumers' emotion responses to products, particularly for high-emotion products, such as chocolate. Using the EsSense Profile®, King *et al.* (2013) reported impacts on emotion responses of questionnaire format, number of samples, and context (name, aroma, flavor). With the growing use of emotion methods in the consumer sciences, there remains little research towards developing emotion questionnaires for use with school-aged children (Laureati *et al.* 2015). In developing such approaches, it is important to consider the impact that study context can have on the results.

The purpose of the current research is to compare children's reported liking and emotions in response to three assessment conditions: response to an image of the stimulus, response to appearance of the sample prior to tasting, and response after tasting the sample. Emotion words and emojis, small pictorial face images popular in online and mobile communication, were used as emotion responses. Emotion responses within an assessment condition and across assessment conditions were compared to understand differences in the nature of the stimulus.

Materials and Methods

Food Image Study

One hundred children completed an evaluation of food images using Compusense at hand (Compusense Inc., Guelph, Ontario, Canada). All participants were recruited through the parent or legal guardians in the Kansas City metro region. Participants were recruited to achieve a distribution of children aged 7 to 11, as well as a balance in gender of participants. Sessions

were offered in the morning and afternoon on a day where multiple local public school districts had scheduled early dismissal or no school.

Eight products were photographed for the image test: baby carrots, cheddar cheese, chocolate graham snacks, fresh spinach, lychee gummy candy, orange juice, white bread, and white grapes. These items were selected to elicit a range of emotions from participants. All items were photographed against a white background and unbranded, with the exception of the lychee gummy. On its own, the lychee gummy is a round, pale yellow gummy with few distinguishing features. As this sample was selected with the intention of being an unfamiliar product to the participants, the researchers hypothesized that the image, along with the unfamiliar fruit name, would result in low emotion selection frequencies during testing. To provide participants with context and elicit emotions related to foreign or unfamiliar products, an unwrapped lychee gummy was photographed next to an individually wrapped candy.

Before each session, a moderator provided children with background information about the study and examples of questions that would be asked to familiarize participants with the task. First, respondents completed emotion questions about self-selected foods or beverages to introduce children to the emotion word and emoji questions. Prior to food image assessment, participants were asked to select words, followed by emojis to determine the child's emotion at baseline. Using a check-all-that-apply (CATA) format, children were asked to select emotion words or emojis that matched how the stimulus made them feel. Emotions words were presented in alphabetical order, while emojis were randomized to the assessor so that each participant saw the same randomized order or emojis for each sample, as recommended by Meyners and Castura (2016). Emotion words and emojis relevant to children's experiences with food were identified

through prior focus group testing with a different group of 8 to 11-year-old children conducted at our research facility (Gallo *et al.* 2017a).

After indicating how they felt at baseline, children answered questions about eight food images. The eight images were presented in a randomized and balanced order. For each image, the child was asked whether they had tried the food before, how much they like the food based on the picture, word emotions, and emoji emotions. Liking of each image was assessed using the 9-point Peryam & Kroll super good/super bad scale (Kroll 1990). The questionnaire concluded with follow-up questions about the study experience and children's demographics.

Served Food Study

A total of 111 children participated in the served food study. Children were recruited through their parents and screened for willingness to eat all 8 study foods. Children were recruited for a balance of ages 7 to 11 and gender balance. Children with allergies or dietary restrictions and participants from the food image study were not eligible to participate in this study. Sessions were offered throughout the morning and afternoon on a day when local public elementary schools were not in session. All testing was conducted in the same facility as the image study.

Findings from the image study were used to narrow the list of words and emojis relevant to the products presented. In this study, the remaining 28 words and 28 emojis were used to assess children's emotion responses. Further details concerning the selection of words and emojis are discussed in a previous publication (Gallo *et al.* 2017a). For the purposes of this paper, only the 28 words and 28 emojis used in both studies, shown in Table 6.1, will be discussed further.

TABLE 6.1 EMOJIS AND WORDS INCLUDED IN IMAGE AND TASTE STUDIES FOR CHILDREN'S EMOTION ASSESSMENT (APPLE® IOS 8.3 EMOJIS USED WITH PERMISSION).

Emojis		
Grinning Face	Unamused Face	Face With Open Mouth and Cold Sweat
Smiling Face With Smiling Eyes	Worried Face	Tired Face
Smiling Face	Confused Face	Fearful Face
Winking Face	Expressionless Face	Smiling Face With Sunglasses
Face Without Mouth	Persevering Face	Grimacing Face
Smiling Face With Heart-Shaped Eyes	Crying Face	Face Screaming in Fear
Frowning Face With Open Mouth	Loudly Crying Face	Angry Face
Face With Stuck-Out Tongue	Face Savouring Delicious Food	Pouting Face
Flushed Face	Disappointed but Relieved Face	Confounded Face
Relieved Face		

Words		
Active	Disappointed	Joyful
Adventurous	Disgusted	Peaceful
Amazed	Enjoyment	Pleasant
Anger	Excited	Pleased
Bad	Free	Powerful
Bored	Friendly	Sad
Calm	Glad	Satisfied
Cheerful	Good	Thankful
Cool	Happy	Upset
Cozy		

As with the image study, the session began with a brief introduction by a moderator, followed by warm-up emotion word and emoji questions about self-selected foods or beverages. The questionnaire in the tasted food study was designed to mirror the questionnaire used in the image assessment. Baseline emotion was measured prior to food evaluation. Foods served were identical to those shown in pictures in the image test. Samples were presented in a randomized and balanced order. Children were instructed by the moderator and within the questionnaire to refrain from eating until prompted to do so through text instructions. For each food, children were asked whether they had tried the food before, appearance liking, word or emoji emotions in response to appearance (before tasting), overall liking (after tasting), and post-taste emotions using emotion words and emojis. A timed, 30 second break was enforced between samples, and children were instructed to have unsalted top crackers and water during this time. After all samples had been presented, children were asked follow-up questions about the study experience and their demographics.

Data Analysis

Data from the two studies were combined to compare children's emotion responses obtained through 3 types of assessment: image, appearance, and post-taste emotions. All analyses aside from forward regression were completed using XLSTAT 2015 (Addinsoft, Paris, France). Analysis of variance (ANOVA) with pairwise comparisons using Tukey's honest significant difference (HSD) was used to identify differences in liking responses between the image, appearance, and taste assessments.

To understand children's emotional responses to products, data were analyzed two ways: analysis of raw CATA data, and analysis of the change in emotion from baseline. This allows for an understanding of how children's emotions changed in response to the stimulus, while

capturing emotions which may be present (or not present) both at baseline and in response to the product. Raw CATA responses within each assessment (image, appearance, and taste) were analyzed using Cochran's Q tests with the Marascuilo procedure for pairwise comparisons to identify significant differences in emotion word and emoji selection between the eight samples. Emotion word and emoji responses were analyzed separately.

To investigate change in emotion in response to stimulus, values for image, appearance, and taste emotions were subtracted from baseline emotion responses. The resulting data set reflected the change in emotion from baseline, where a value of -1 indicated the emotion was selected in response to the stimulus but not selected at baseline, a value of 0 indicated no change in response between baseline and stimulus presentation, and a value of 1 indicated the emotion was selected at baseline but not in response to the stimulus. These data were analyzed using the Kruskal-Wallis test with the Conover-Iman method for multiple comparisons to identify differences in change in response between the eight products. Emotion words and emoji responses were analyzed separately.

In addition to investigating within test results across products, analyses were conducted to understand the differences across the image, appearance, and taste emotion responses. Contingency tables were created for the three assessment methods for both emotion words and emojis for the following: frequency of emotion selection, frequency of increase from baseline, and frequency of decrease from baseline. These contingency tables were subjected to Pearson's chi-squared test statistics to identify differences in word or emoji responses between the three assessment methods. Separate analyses were conducted for each food item, and words and emojis were analyzed separately. Words or emojis with no selections for a food for all three assessments were removed from the analysis.

The REGRESSION procedure in SAS 9.4 (SAS Institute Inc., Cary, NC, USA) was used to identify emotion word and emoji models predictive of liking for the overall data set, image, appearance, and taste responses. A forward regression procedure on the full study data, individual samples, and consumer clusters was used to identify emotions relevant to consumers' coffee drinking experience (Bhumiratana *et al.* 2014). In this study, the forward regression approach is presented to illustrate differences between the three assessment conditions. The forward selection procedure with a significance level of 0.20 was used to identify both words and emojis that predicted children's liking responses. This analysis was conducted on children's liking and emotion responses to the image, appearance, and taste, as well a combined data set with all 3 assessments.

Results

Liking and Familiarity

Mean liking scores and familiarity responses are provided in Table 6.2. Significant differences were observed in the overall liking responses from the participants based on the type of assessment. Post-taste liking scores were directionally higher than image liking scores for all foods, and these differences were significant for cheddar cheese, chocolate graham snacks, lychee gummy candy, and white bread. Appearance liking scores were also significantly higher than image liking scores for cheddar cheese and lychee gummy candy. Additionally, post-taste liking scores were significantly higher than image liking scores for cheddar cheese and lychee gummy candy. The largest difference in liking scores between the taste and image conditions was observed for the lychee gummy candy, which was also the least familiar of the samples. In these studies, most participants had either not tried the candy, or were not sure whether or not they had tried the candy. The majority of children in both studies had previously tried orange

juice, baby carrots, white grapes, cheddar cheese, and white bread. Although children in the image test were not screened for past consumption or willingness to eat the foods, a higher percentage of participants in the image study reported having tried white grapes, chocolate graham snacks, white bread, and fresh spinach.

TABLE 6.2 MEAN LIKING AND PERCENT FAMILIARITY OF SAMPLES

	Baby Carrots	Cheddar Cheese	Chocolate Grahams	Fresh Spinach	Lychee Gummy	Orange Juice	White Bread	White Grapes
Liking								
Image	6.4[a]	6.2[b]	7.2[b]	4.8[a]	5.5[b]	7.3[a]	7.1[b]	7.3[a]
Appearance	6.6[a]	7.0[a]	7.6[ab]	5.1[a]	6.6[a]	7.5[a]	7.4[b]	7.0[a]
Taste	7.0[a]	7.1[a]	8.0[a]	5.2[a]	7.2[a]	7.7[a]	7.9[a]	7.6[a]
p-value	*0.117*	*0.007*	*0.005*	*0.492*	*<0.0001*	*0.290*	*0.0001*	*0.077*
Familiarity								
Image Study (n=100)								
Yes	92%	83%	82%	67%	6%	100%	81%	92%
No	3%	4%	8%	12%	78%	0%	2%	3%
Unsure	5%	13%	10%	21%	16%	0%	17%	5%
Taste Test (n=111)								
Yes	95%	86%	67%	57%	12%	98%	76%	70%
No	3%	5%	12%	27%	46%	1%	2%	9%
Unsure	2%	10%	22%	16%	42%	1%	23%	21%

Means in the same column with the same superscript are not significantly different at $p < 0.05$ according to pairwise comparisons with Tukey's HSD.

Comparison of Emotion Responses Across Products

Emotion Words

Significant differences in frequency of selection for emotion words across products are shown in Table 6.3. Significant differences across products were observed for 25 emotion words in the image assessment, 24 words in the post-taste assessment, and 21 words in the appearance evaluation. Several emotion words were significantly different across products for all three assessment methods, however the pairwise comparisons varied by assessment. Pairwise comparisons from the image data set showed differences between lychee gummy candy and well-liked products (such as orange juice and grapes) for positive terms like friendly and

TABLE 6.3 SIGNIFICANT DIFFERENCES IN FREQUENCY (%) OF WORD SELECTION AMONG PRODUCTS AT P < 0.05 WITH COCHRAN'S Q TEST

Image (n=100)

Emotion	p-value**	Carrots	Cheddar	Chocolate Grahams	Spinach	Lychee Gummy	Orange Juice	Bread	Grapes
Active	<0.0001	23.0^{abc}	17.0^{ab}	19.0^{abc}	14.0^{ab}	8.0^{a}	35.0^{c}	14.0^{ab}	27.0^{bc}
Adventurous	0.0084	13.0^{ab}	11.0^{ab}	14.0^{ab}	8.0^{a}	8.0^{a}	22.0^{b}	10.0^{ab}	16.0^{ab}
Amazed	0.0076	14.0^{ab}	18.0^{ab}	15.0^{ab}	8.0^{a}	10.0^{a}	25.0^{b}	11.0^{ab}	16.0^{ab}
Bad	<0.0001	12.0^{ab}	12.0^{ab}	5.0^{a}	22.0^{b}	7.0^{a}	6.0^{a}	2.0^{a}	1.0^{a}
Calm	<0.0001	20.0^{abc}	19.0^{abc}	21.0^{abc}	13.0^{ab}	6.0^{a}	34.0^{c}	23.0^{bc}	24.0^{bc}
Cheerful	0.0002	19.0^{abc}	19.0^{abc}	24.0^{bc}	9.0^{ab}	8.0^{a}	27.0^{c}	19.0^{abc}	25.0^{c}
Cool	<0.0001	22.0^{abc}	19.0^{ab}	33.0^{bc}	14.0^{a}	11.0^{a}	37.0^{c}	19.0^{ab}	32.0^{bc}
Cozy	0.0001	11.0^{a}	15.0^{ab}	15.0^{ab}	6.0^{a}	5.0^{a}	25.0^{b}	13.0^{ab}	12.0^{ab}
Disappointed	0.0012	4.0^{a}	8.0^{ab}	4.0^{a}	14.0^{b}	3.0^{a}	7.0^{ab}	1.0^{a}	3.0^{a}
Disgusted	<0.0001	7.0^{a}	11.0^{ab}	3.0^{a}	20.0^{b}	10.0^{ab}	5.0^{a}	2.0^{a}	7.0^{a}
Enjoyment	0.0113	9.0^{ab}	9.0^{ab}	14.0^{b}	8.0^{ab}	2.0^{a}	15.0^{b}	8.0^{ab}	6.0^{ab}
Excited	0.0011	10.0^{ab}	13.0^{ab}	17.0^{b}	6.0^{ab}	2.0^{a}	19.0^{b}	13.0^{ab}	11.0^{ab}
Free	0.0011	10.0^{ab}	7.0^{ab}	17.0^{b}	3.0^{a}	7.0^{ab}	18.0^{b}	12.0^{ab}	14.0^{ab}
Friendly	<0.0001	9.0^{a}	7.0^{a}	15.0^{ab}	6.0^{a}	4.0^{a}	22.0^{b}	14.0^{ab}	11.0^{ab}
Glad	<0.0001	16.0^{abc}	17.0^{abc}	19.0^{abc}	11.0^{ab}	4.0^{a}	29.0^{c}	23.0^{bc}	29.0^{c}
Good	<0.0001	28.0^{abc}	33.0^{bc}	38.0^{c}	18.0^{ab}	15.0^{a}	44.0^{c}	33.0^{bc}	37.0^{c}
Happy	<0.0001	22.0^{abc}	31.0^{cd}	39.0^{cd}	10.0^{a}	13.0^{ab}	44.0^{d}	28.0^{bcd}	40.0^{d}
Joyful	<0.0001	16.0^{abc}	15.0^{ab}	18.0^{abc}	11.0^{ab}	8.0^{a}	31.0^{c}	19.0^{abc}	25.0^{bc}
Peaceful	0.0040	15.0^{ab}	13.0^{ab}	19.0^{b}	11.0^{ab}	4.0^{a}	21.0^{b}	16.0^{ab}	13.0^{ab}
Powerful	0.0431	8.0^{ab}	8.0^{ab}	11.0^{ab}	5.0^{ab}	3.0^{a}	15.0^{b}	9.0^{ab}	8.0^{ab}
Satisfied	0.0352	11.0^{a}	17.0^{a}	14.0^{a}	7.0^{a}	6.0^{a}	18.0^{a}	13.0^{a}	12.0^{a}
Thankful	0.0058	15.0^{ab}	13.0^{ab}	15.0^{ab}	8.0^{a}	6.0^{a}	22.0^{b}	13.0^{ab}	15.0^{ab}
Upset	0.0008	3.0^{a}	4.0^{ab}	3.0^{a}	12.0^{b}	1.0^{a}	4.0^{ab}	1.0^{a}	2.0^{a}

Appearance (n=111)

Emotion	p-value**	Carrots	Cheddar	Chocolate Grahams	Spinach	Lychee Gummy	Orange Juice	Bread	Grapes
Bad	<0.0001	7.2^{a}	6.3^{a}	3.6^{a}	21.6^{b}	5.4^{a}	1.8^{a}	0.9^{a}	1.8^{a}
Bored	<0.0001	8.1^{ab}	1.8^{a}	2.7^{a}	13.5^{b}	6.3^{ab}	0.9^{a}	2.7^{a}	2.7^{a}
Cheerful	0.0002	9.9^{ab}	17.1^{ab}	23.4^{b}	5.4^{a}	19.8^{b}	21.6^{b}	22.5^{b}	14.4^{ab}
Cool	0.0016	12.6^{ab}	18.9^{ab}	22.5^{b}	7.2^{a}	20.7^{ab}	21.6^{b}	23.4^{b}	18.9^{ab}
Disappointed	<0.0001	4.5^{a}	3.6^{a}	0.0^{a}	15.3^{b}	2.7^{a}	3.6^{a}	0.0^{a}	0.9^{a}
Disgusted	<0.0001	6.3^{a}	2.7^{a}	1.8^{a}	18.0^{b}	7.2^{a}	6.3^{a}	0.0^{a}	5.4^{a}
Enjoyment	0.0002	9.9^{a}	13.5^{ab}	25.2^{b}	5.4^{a}	14.4^{ab}	14.4^{ab}	15.3^{ab}	15.3^{ab}
Excited	0.0006	14.4^{ab}	18.0^{abc}	28.8^{c}	9.0^{a}	21.6^{abc}	20.7^{abc}	24.3^{bc}	17.1^{abc}
Free	0.0038	9.0^{ab}	12.6^{ab}	13.5^{b}	1.8^{a}	6.3^{ab}	8.1^{ab}	15.3^{b}	10.8^{ab}
Friendly	0.0035	8.1^{ab}	9.9^{ab}	16.2^{b}	4.5^{a}	9.0^{ab}	10.8^{ab}	16.2^{b}	15.3^{ab}
Glad	0.0016	18.9^{ab}	25.2^{ab}	28.8^{b}	11.7^{a}	21.6^{ab}	28.8^{b}	27.0^{b}	27.0^{b}
Good	0.0003	29.7^{ab}	36.0^{b}	36.9^{b}	17.1^{a}	32.4^{ab}	39.6^{b}	36.9^{b}	36.0^{b}
Happy	<0.0001	29.7^{ab}	37.8^{bc}	47.7^{c}	15.3^{a}	36.0^{bc}	39.6^{bc}	37.8^{bc}	41.4^{bc}
Joyful	0.0013	18.0^{ab}	22.5^{ab}	27.0^{b}	9.0^{a}	18.9^{ab}	24.3^{b}	26.1^{b}	23.4^{b}
Peaceful	0.0301	13.5^{a}	19.8^{a}	17.1^{a}	10.8^{a}	10.8^{a}	20.7^{a}	20.7^{a}	18.9^{a}
Pleased	0.0066	18.9^{ab}	18.0^{ab}	23.4^{ab}	11.7^{a}	13.5^{ab}	21.6^{ab}	27.0^{b}	24.3^{ab}
Sad	<0.0001	4.5^{ab}	4.5^{ab}	0.9^{a}	10.8^{b}	3.6^{ab}	1.8^{a}	0.9^{a}	0.0^{a}
Thankful	0.0442	13.5^{a}	15.3^{a}	22.5^{a}	11.7^{a}	13.5^{a}	18.9^{a}	21.6^{a}	18.0^{a}

Taste (n=111)

Emotion	p-value**	Carrots	Cheddar	Chocolate Grahams	Spinach	Lychee Gummy	Orange Juice	Bread	Grapes
Active	0.0207	18.9^{b}	16.2^{ab}	14.4^{ab}	6.3^{a}	12.6^{ab}	19.8^{b}	13.5^{ab}	14.4^{ab}
Amazed	0.0447	12.6^{a}	18.0^{a}	24.3^{a}	10.8^{a}	19.8^{a}	20.7^{a}	18.0^{a}	20.7^{a}
Bad	<0.0001	6.3^{a}	7.2^{a}	3.6^{a}	23.4^{b}	6.3^{a}	3.6^{a}	0.0^{a}	3.6^{a}
Bored	<0.0001	5.4^{ab}	4.5^{a}	0.0^{a}	12.6^{b}	1.8^{a}	1.8^{a}	2.7^{a}	3.6^{a}
Cheerful	0.0004	9.9^{ab}	16.2^{ab}	18.9^{b}	3.6^{a}	18.9^{b}	18.9^{b}	20.7^{b}	14.4^{ab}

Cool	0.0066	14.4 [a]	18.9 [ab]	24.3 [ab]	13.5 [a]	28.8 [b]	23.4 [ab]	24.3 [ab]	24.3 [ab]
Cozy	0.0463	4.5 [a]	12.6 [a]	9.0 [a]	5.4 [a]	8.1 [a]	10.8 [a]	14.4 [a]	10.8 [a]
Disappointed	<0.0001	1.8 [a]	7.2 [ab]	0.9 [a]	12.6 [b]	9.0 [ab]	2.7 [a]	1.8 [a]	3.6 [a]
Disgusted	<0.0001	4.5 [a]	7.2 [a]	0.9 [a]	23.4 [b]	9.0 [a]	2.7 [a]	0.0 [a]	2.7 [a]
Enjoyment	<0.0001	11.7 [ab]	16.2 [abc]	26.1 [c]	3.6 [a]	17.1 [bc]	23.4 [bc]	18.9 [bc]	18.9 [bc]
Excited	0.0034	16.2 [ab]	20.7 [ab]	24.3 [b]	7.2 [a]	24.3 [b]	22.5 [b]	18.9 [ab]	18.9 [ab]
Free	0.0147	11.7 [ab]	12.6 [ab]	16.2 [b]	3.6 [a]	16.2 [b]	13.5 [ab]	16.2 [b]	16.2 [b]
Friendly	0.0004	7.2 [ab]	9.0 [abc]	18.9 [c]	5.4 [a]	13.5 [abc]	15.3 [abc]	17.1 [bc]	12.6 [abc]
Glad	0.0004	19.8 [ab]	28.8 [b]	31.5 [b]	13.5 [a]	26.1 [ab]	34.2 [b]	28.8 [b]	25.2 [ab]
Good	<0.0001	35.1 [b]	37.8 [b]	40.5 [b]	17.1 [a]	44.1 [b]	43.2 [b]	40.5 [b]	44.1 [b]
Happy	<0.0001	33.3 [b]	43.2 [bc]	54.1 [c]	14.4 [a]	45.9 [bc]	43.2 [bc]	41.4 [bc]	48.6 [bc]
Joyful	<0.0001	17.1 [ab]	24.3 [ab]	30.6 [b]	9.9 [a]	24.3 [ab]	31.5 [b]	27.0 [b]	30.6 [b]
Peaceful	0.0215	14.4 [ab]	18.9 [ab]	19.8 [ab]	9.0 [a]	18.0 [ab]	19.8 [ab]	21.6 [ab]	22.5 [b]
Pleasant	0.0003	13.5 [ab]	14.4 [ab]	21.6 [b]	5.4 [a]	17.1 [ab]	21.6 [b]	19.8 [b]	10.8 [ab]
Pleased	0.0009	18.0 [ab]	24.3 [abc]	33.3 [c]	13.5 [a]	21.6 [abc]	28.8 [bc]	23.4 [abc]	23.4 [abc]
Satisfied	0.0129	19.8 [a]	14.4 [a]	26.1 [a]	13.5 [a]	21.6 [a]	23.4 [a]	23.4 [a]	17.1 [a]
Thankful	0.0074	15.3 [ab]	18.0 [ab]	23.4 [b]	9.0 [a]	18.0 [ab]	19.8 [ab]	22.5 [b]	15.3 [ab]
Upset	<0.0001	6.3 [ab]	3.6 [a]	0.0 [a]	11.7 [b]	1.8 [a]	1.8 [a]	1.8 [a]	0.9 [a]

**p-value of Cochran's Q test with the Marascuilo procedure for pairwise comparisons. Frequencies (%) in the same row with the same superscript are not significantly different at $p < 0.05$ according to the Marascuilo procedure for pairwise comparisons.

cheerful. Alternatively, responses in the sample appearance and post-taste conditions tended to reflect differences between the disliked fresh spinach, which had had higher frequencies of negative emotion terms such as bad and disappointed, and well-liked products, which had higher frequency of positive terms like happy and joyful. Four words were only significantly different across the products in one condition: adventurous, calm, and powerful had significantly different selection frequencies in the image condition, and pleasant had significantly different selection frequencies for the post-taste assessment. Some of these differences observed only in the image condition may be due to low frequency of selection of emotion words for the lychee candy, for which no emotion term was selected by more than 15% of participants.

Table 6.4 adds to the findings from the analysis of the raw CATA data with information about the change in emotion word selection between baseline and stimulus presentation. Significant differences in mean change in response were observed for 10 emotion terms in the image condition, 9 words in the appearance condition, and 10 words in the taste assessment. A greater proportion of negative emotion words versus positive emotion words were significantly

different across products, as compared to the results from analysis of raw CATA data shown in

Table 6.3. Bad, disappointed, disgusted, happy, and upset were significantly different across

TABLE 6.4 SIGNIFICANT DIFFERENCES IN MEAN CHANGE IN EMOTION WORD SELECTION FROM BASELINE ACROSS SAMPLES

Image

Emotion	p-value**	Carrots	Cheddar	Chocolate Grahams	Spinach	Lychee Gummy	Orange Juice	Bread	Grapes
Active	0.021	0.07 [ab]	0.13 [ab]	0.11 [ab]	0.16 [ab]	0.22 [b]	-0.05 [a]	0.16 [ab]	0.03 [ab]
Anger	0.030	-0.05 [a]	-0.04 [a]	-0.05 [a]	-0.07 [a]	-0.01 [a]	-0.03 [a]	0.00 [a]	0.00 [a]
Bad	< 0.0001	-0.11 [ab]	-0.11 [ab]	-0.04 [b]	-0.21 [a]	-0.06 [b]	-0.05 [b]	-0.01 [b]	0.00 [b]
Cool	0.008	0.09 [ab]	0.12 [ab]	-0.02 [ab]	0.17 [ab]	0.20 [b]	-0.06 [a]	0.12 [ab]	-0.01 [ab]
Disappointed	0.002	-0.04 [ab]	-0.08 [ab]	-0.04 [ab]	-0.14 [a]	-0.03 [b]	-0.07 [ab]	-0.01 [b]	-0.03 [b]
Disgusted	0.001	-0.05 [ab]	-0.09 [ab]	-0.01 [b]	-0.18 [a]	-0.08 [ab]	-0.03 [b]	0.00 [b]	-0.05 [ab]
Glad	0.027	0.26 [ab]	0.25 [ab]	0.23 [ab]	0.31 [ab]	0.38 [b]	0.13 [a]	0.19 [ab]	0.13 [ab]
Good	0.012	0.23 [ab]	0.18 [ab]	0.13 [ab]	0.33 [ab]	0.36 [b]	0.07 [a]	0.18 [ab]	0.14 [ab]
Happy	0.001	0.26 [abc]	0.17 [abc]	0.09 [abc]	0.38 [c]	0.35 [bc]	0.04 [a]	0.20 [abc]	0.08 [ab]
Upset	0.008	-0.02 [ab]	-0.03 [ab]	-0.02 [ab]	-0.11 [a]	0.00 [b]	-0.03 [ab]	0.00 [b]	-0.01 [b]

Appearance

Emotion	p-value**	Carrots	Cheddar	Chocolate Grahams	Spinach	Lychee Gummy	Orange Juice	Bread	Grapes
Anger	0.008	-0.04 [ab]	0.00 [ab]	0.01 [b]	-0.06 [a]	0.00 [ab]	-0.01 [ab]	0.01 [b]	0.01 [b]
Bad	< 0.0001	-0.06 [b]	-0.05 [b]	-0.03 [b]	-0.21 [a]	-0.05 [b]	-0.01 [b]	0.00 [b]	-0.01 [b]
Bored	0.029	-0.02 [ab]	0.05 [ab]	0.04 [ab]	-0.07 [a]	0.00 [ab]	0.05 [b]	0.04 [ab]	0.04 [ab]
Disappointed	< 0.0001	-0.05 [b]	-0.04 [b]	0.00 [b]	-0.15 [a]	-0.03 [b]	-0.04 [b]	0.00 [b]	-0.01 [b]
Disgusted	< 0.0001	-0.06 [b]	-0.03 [b]	-0.02 [b]	-0.18 [a]	-0.07 [b]	-0.06 [b]	0.00 [b]	-0.05 [b]
Enjoyment	0.043	0.04 [ab]	0.00 [ab]	-0.12 [a]	0.08 [b]	-0.01 [ab]	-0.01 [ab]	-0.02 [ab]	-0.02 [ab]
Happy	0.004	0.09 [ab]	0.01 [ab]	-0.09 [a]	0.23 [b]	0.03 [ab]	-0.01 [ab]	0.01 [ab]	-0.03 [ab]
Sad	0.000	-0.05 [ab]	-0.05 [ab]	-0.01 [b]	-0.11 [a]	-0.04 [ab]	-0.02 [b]	-0.01 [b]	0.00 [b]
Upset	0.009	-0.04 [ab]	-0.02 [ab]	0.00 [b]	-0.09 [a]	-0.02 [ab]	-0.03 [ab]	-0.01 [ab]	0.01 [b]

Taste

Emotion	p-value**	Carrots	Cheddar	Chocolate Grahams	Spinach	Lychee Gummy	Orange Juice	Bread	Grapes
Bad	< 0.0001	-0.05 [b]	-0.06 [b]	-0.03 [b]	-0.23 [a]	-0.05 [b]	-0.03 [b]	0.01 [b]	-0.03 [b]
Bored	0.044	0.01 [ab]	0.02 [ab]	0.06 [b]	-0.06 [a]	0.05 [ab]	0.05 [ab]	0.04 [ab]	0.03 [ab]
Disappointed	0.000	-0.02 [b]	-0.07 [ab]	-0.01 [b]	-0.13 [a]	-0.09 [ab]	-0.03 [b]	-0.02 [b]	-0.04 [ab]
Disgusted	< 0.0001	-0.05 [b]	-0.07 [b]	-0.01 [b]	-0.23 [a]	-0.09 [b]	-0.03 [b]	0.00 [b]	-0.03 [b]
Enjoyment	0.004	0.02 [ab]	-0.03 [ab]	-0.13 [a]	0.10 [b]	-0.04 [ab]	-0.10 [a]	-0.05 [ab]	-0.05 [ab]
Good	0.013	0.09 [ab]	0.06 [ab]	0.04 [ab]	0.27 [b]	0.00 [a]	0.01 [a]	0.04 [ab]	0.00 [a]
Happy	0.000	0.05 [ab]	-0.05 [a]	-0.15 [a]	0.24 [b]	-0.07 [a]	-0.05 [a]	-0.03 [a]	-0.10 [a]
Joyful	0.031	0.07 [a]	0.00 [a]	-0.06 [a]	0.14 [a]	0.00 [a]	-0.07 [a]	-0.03 [a]	-0.06 [a]
Sad	< 0.0001	-0.05 [ab]	-0.06 [ab]	0.00 [b]	-0.09 [a]	-0.05 [ab]	0.00 [b]	0.00 [b]	-0.01 [b]
Upset	0.000	-0.05 [ab]	-0.03 [ab]	0.01 [b]	-0.11 [a]	-0.01 [b]	-0.01 [b]	-0.01 [b]	0.00 [b]

**p-value of Kruskal-Wallis test. Means in the same row with the same superscript are not significantly different at $p < 0.05$ using the Conover-Iman procedure for multiple pairwise comparisons. Values show the mean change in response from baseline, where a mean of -1 indicates all respondents selected an emotion in response to the stimulus but did not select the emotion at baseline, a mean of 0 indicates no change in selection from baseline, and a mean of 1 indicates all respondents selected an emotion at baseline but not in response to the stimulus.

products for all three assessment conditions. Again, in the image condition, pairwise comparisons show differences between the unfamiliar lychee gummy candy and other stimuli. In the image condition, lychee gummy candy responses show a pattern of reduced selection from baseline of positive words, and little increase from baseline in selection of negative emotions. Four terms were only significantly different across products in one assessment condition: active, cool, and glad were significantly different in mean change from baseline emotion response in the image assessment condition, and joyful had significant differences in mean change in the taste condition.

Emojis

Throughout the discussion, emojis will be referred to by their Unicode emoji names (Unicode 2016). Differences in frequency of emoji selection for each assessment condition are shown in Table 6.5. Significant differences in emoji selection frequency across products were observed for 15 emojis in the image condition, 22 emojis in the appearance condition, and 22 emojis in the taste condition. Emojis which were significantly different in the appearance and taste conditions, but not the image condition, were emojis illustrating negative emotions, such as Crying Face and Worried Face. Similarly to the word responses, key differences in the image condition were observed when emoji selection was lower for lychee gummy candy than other products in the image condition. In the appearance and taste conditions more differences between the disliked spinach and other products were observed. Negative emojis, such as Worried Face and Confounded Face, were selected more frequently in response to spinach as compared to other products. Positive emojis, including Grinning Face and Smiling Face with Heart-Shaped Eyes were selected less frequently for spinach compared to other stimuli.

TABLE 6.5 SIGNIFICANT DIFFERENCES IN FREQUENCY (%) OF EMOJI SELECTION AMONG PRODUCTS AT P < 0.05 WITH COCHRAN'S Q TEST

Emoji Name	Emoji	p-value**	Carrots	Cheddar	Chocolate Grahams	Spinach	Lychee Gummy	Orange Juice	Bread	Grapes
		Image (n=100)								
Grinning Face		<0.0001	25.0^{ab}	33.0^{b}	38.0^{b}	25.0^{ab}	10.0^{a}	41.0^{b}	30.0^{b}	38.0^{b}
Smiling Face With Smiling Eyes		<0.0001	28.0^{abc}	26.0^{abc}	31.0^{bc}	20.0^{ab}	13.0^{a}	36.0^{bc}	28.0^{abc}	38.0^{c}
Smiling Face		<0.0001	26.0^{abc}	22.0^{abc}	28.0^{bc}	13.0^{ab}	11.0^{a}	34.0^{c}	22.0^{abc}	31.0^{c}
Winking Face		0.0036	15.0^{ab}	13.0^{ab}	21.0^{b}	13.0^{ab}	7.0^{a}	23.0^{b}	18.0^{ab}	22.0^{b}
Smiling Face With Heart-Shaped Eyes		0.0002	12.0^{abc}	17.0^{abc}	24.0^{c}	9.0^{ab}	7.0^{a}	20.0^{abc}	13.0^{abc}	21.0^{bc}
Face With Stuck-Out Tongue and Winking Eye		<0.0001	14.0^{ab}	19.0^{ab}	19.0^{ab}	9.0^{a}	6.0^{a}	28.0^{b}	11.0^{a}	17.0^{ab}
Face With Stuck-Out Tongue		0.0020	22.0^{abc}	19.0^{abc}	16.0^{abc}	11.0^{ab}	8.0^{a}	26.0^{c}	18.0^{abc}	23.0^{bc}
Relieved Face		0.0003	19.0^{ab}	22.0^{b}	20.0^{ab}	12.0^{ab}	6.0^{a}	25.0^{b}	26.0^{b}	23.0^{b}
Confused Face		0.0230	15.0^{a}	9.0^{a}	6.0^{a}	13.0^{a}	12.0^{a}	6.0^{a}	5.0^{a}	4.0^{a}
Face Savouring Delicious Food		<0.0001	25.0^{abc}	29.0^{abc}	34.0^{c}	16.0^{ab}	13.0^{a}	38.0^{c}	23.0^{abc}	31.0^{bc}
Tired Face		0.0169	6.0^{a}	8.0^{a}	2.0^{a}	7.0^{a}	4.0^{a}	3.0^{a}	1.0^{a}	0.0^{a}
Smiling Face With Sunglasses		0.0002	21.0^{ab}	19.0^{ab}	27.0^{b}	16.0^{ab}	7.0^{a}	28.0^{b}	20.0^{ab}	27.0^{b}
Angry Face		0.0067	6.0^{a}	8.0^{a}	0.0^{a}	7.0^{a}	1.0^{a}	4.0^{a}	1.0^{a}	2.0^{a}
Pouting Face		0.0016	6.0^{ab}	6.0^{ab}	4.0^{ab}	12.0^{b}	2.0^{a}	3.0^{a}	1.0^{a}	1.0^{a}
Confounded Face		0.0340	7.0^{a}	10.0^{a}	3.0^{a}	8.0^{a}	5.0^{a}	5.0^{a}	1.0^{a}	2.0^{a}
		Appearance (n=111)								
Grinning Face		<0.0001	36.0^{ab}	40.5^{b}	51.4^{b}	21.6^{a}	40.5^{b}	41.4^{b}	35.1^{ab}	39.6^{b}
Smiling Face With Smiling Eyes		<0.0001	34.2^{b}	27.9^{ab}	41.4^{b}	12.6^{a}	27.9^{ab}	38.7^{b}	34.2^{b}	34.2^{b}
Smiling Face With Heart-Shaped Eyes		<0.0001	10.8^{ab}	13.5^{abc}	21.6^{bc}	5.4^{a}	15.3^{abc}	25.2^{c}	16.2^{abc}	12.6^{ab}
Face With Stuck-Out Tongue and Winking Eye		0.0406	2.7^{a}	3.6^{a}	0.0^{a}	5.4^{a}	4.5^{a}	1.8^{a}	0.9^{a}	0.0^{a}
Face With Stuck-Out Tongue		0.0002	13.5^{ab}	15.3^{ab}	26.1^{b}	6.3^{a}	22.5^{b}	20.7^{b}	21.6^{b}	18.0^{ab}
Flushed Face		0.0261	1.8^{ab}	3.6^{ab}	0.9^{a}	9.0^{b}	5.4^{ab}	2.7^{ab}	3.6^{ab}	6.3^{ab}
Unamused Face		0.0307	5.4^{ab}	3.6^{ab}	0.0^{a}	7.2^{b}	3.6^{ab}	0.9^{ab}	1.8^{ab}	2.7^{ab}
Worried Face		0.0006	4.5^{ab}	3.6^{ab}	0.9^{a}	9.0^{b}	1.8^{a}	1.8^{a}	0.0^{a}	0.9^{a}

Emoji Name	Emoji	p-value**	Carrots	Cheddar	Chocolate Grahams	Spinach	Lychee Gummy	Orange Juice	Bread	Grapes
Confused Face		0.0008	9.9[ab]	2.7[a]	4.5[a]	15.3[b]	8.1[ab]	7.2[ab]	1.8[a]	4.5[a]
Expressionless Face		0.0002	13.5[ab]	6.3[a]	3.6[a]	20.7[b]	14.4[ab]	9.9[ab]	7.2[a]	9.9[ab]
Crying Face		0.0357	3.6[a]	0.0[a]	0.0[a]	3.6[a]	1.8[a]	0.0[a]	0.0[a]	1.8[a]
Persevering Face		<0.0001	4.5[a]	0.0[a]	0.9[a]	11.7[b]	2.7[a]	0.9[a]	0.0[a]	0.9[a]
Loudly Crying Face		0.0002	3.6[ab]	1.8[ab]	0.0[a]	6.3[b]	0.9[a]	0.0[a]	0.0[a]	0.0[a]
Face Savouring Delicious Food		<0.0001	27.0[ab]	28.8[b]	34.2[b]	11.7[a]	25.2[ab]	36.0[b]	32.4[b]	21.6[ab]
Disappointed but Relieved Face		<0.0001	1.8[a]	1.8[a]	0.0[a]	8.1[b]	2.7[ab]	0.0[a]	0.0[a]	0.0[a]
Face With Open Mouth and Cold Sweat		0.0002	2.7[ab]	1.8[a]	0.0[a]	7.2[b]	0.9[a]	0.0[a]	0.0[a]	0.9[a]
Tired Face		<0.0001	4.5[ab]	0.9[a]	0.0[a]	9.0[b]	0.9[a]	1.8[a]	0.0[a]	0.0[a]
Fearful Face		0.0101	2.7[ab]	3.6[ab]	0.0[a]	6.3[b]	2.7[ab]	0.9[ab]	0.9[ab]	0.0[a]
Smiling Face With Sunglasses		0.0003	20.7[ab]	26.1[b]	24.3[b]	9.0[a]	21.6[ab]	27.9[b]	26.1[b]	18.0[ab]
Face Screaming in Fear		0.0004	1.8[a]	2.7[a]	2.7[a]	10.8[b]	2.7[a]	0.0[a]	2.7[a]	2.7[a]
Angry Face		<0.0001	4.5[ab]	0.0[a]	0.0[a]	8.1[b]	0.9[a]	0.9[a]	0.0[a]	0.0[a]
Confounded Face		<0.0001	5.4[a]	0.0[a]	0.9[a]	13.5[b]	3.6[a]	2.7[a]	0.0[a]	0.9[a]

		Taste (n=111)								
Emoji Name	Emoji	p-value**	Carrots	Cheddar	Chocolate Grahams	Spinach	Lychee Gummy	Orange Juice	Bread	Grapes
Grinning Face		<0.0001	34.2[ab]	43.2[b]	50.5[b]	21.6[a]	45.9[b]	48.6[b]	49.5[b]	41.4[b]
Smiling Face With Smiling Eyes		<0.0001	29.7[ab]	33.3[b]	40.5[b]	16.2[a]	29.7[ab]	43.2[b]	39.6[b]	29.7[ab]
Smiling Face		0.0005	25.2[ab]	21.6[ab]	28.8[b]	10.8[a]	28.8[b]	26.1[b]	30.6[b]	29.7[b]
Face Without Mouth		0.0060	5.4[ab]	5.4[ab]	1.8[a]	12.6[b]	6.3[ab]	3.6[a]	5.4[ab]	7.2[ab]
Winking Face		0.0012	16.2[a]	18.0[ab]	30.6[b]	11.7[a]	23.4[ab]	24.3[ab]	24.3[ab]	18.0[ab]
Smiling Face With Heart-Shaped Eyes		<0.0001	11.7[ab]	21.6[bc]	24.3[bc]	5.4[a]	25.2[bc]	26.1[c]	23.4[bc]	13.5[abc]
Face With Stuck-Out Tongue and Winking Eye		0.0010	3.6[ab]	5.4[ab]	0.0[a]	9.0[b]	2.7[ab]	1.8[a]	0.9[a]	0.9[a]
Face With Stuck-Out Tongue		0.0013	19.8[ab]	19.8[ab]	27.0[b]	9.0[a]	20.7[ab]	27.9[b]	18.0[ab]	18.9[ab]
Flushed Face		<0.0001	4.5[a]	5.4[a]	2.7[a]	15.3[b]	6.3[a]	0.9[a]	0.9[a]	3.6[a]
Relieved Face		0.0044	24.3[ab]	26.1[ab]	27.0[ab]	15.3[a]	27.0[ab]	19.8[ab]	34.2[b]	21.6[ab]
Worried Face		<0.0001	6.3[a]	2.7[a]	2.7[a]	14.4[b]	0.9[a]	0.9[a]	0.9[a]	1.8[a]
Confused Face		<0.0001	8.1[a]	4.5[a]	2.7[a]	19.8[b]	4.5[a]	3.6[a]	0.9[a]	3.6[a]
Crying Face		0.0022	1.8[ab]	1.8[ab]	0.0[a]	6.3[b]	0.9[a]	0.0[a]	0.0[a]	1.8[ab]

		p-value								
Persevering Face	😖	0.0004	3.6^{ab}	1.8^{a}	0.0^{a}	9.0^{b}	6.3^{ab}	1.8^{a}	0.0^{a}	1.8^{a}
Loudly Crying Face	😭	0.0002	2.7^{ab}	2.7^{ab}	0.0^{a}	7.2^{b}	0.0^{a}	0.0^{a}	0.0^{a}	1.8^{ab}
Face Savouring Delicious Food	😋	0.0002	26.1^{ab}	32.4^{b}	36.9^{b}	16.2^{a}	27.0^{ab}	39.6^{b}	32.4^{b}	28.8^{ab}
Face With Open Mouth and Cold Sweat	😰	0.0122	2.7^{ab}	2.7^{ab}	0.0^{a}	6.3^{b}	1.8^{ab}	0.9^{ab}	0.0^{a}	0.9^{ab}
Tired Face	😩	0.0018	1.8^{ab}	1.8^{ab}	0.0^{a}	6.3^{b}	1.8^{ab}	0.0^{a}	0.0^{a}	0.9^{a}
Smiling Face With Sunglasses	😎	0.0001	20.7^{ab}	20.7^{ab}	30.6^{b}	10.8^{a}	22.5^{ab}	27.0^{b}	30.6^{b}	23.4^{ab}
Angry Face	😠	0.0039	5.4^{ab}	2.7^{ab}	0.9^{ab}	6.3^{b}	0.0^{a}	1.8^{ab}	0.0^{a}	0.9^{ab}
Pouting Face	😡	0.0293	3.6^{ab}	1.8^{ab}	0.9^{ab}	6.3^{b}	3.6^{ab}	1.8^{ab}	0.9^{ab}	0.0^{a}
Confounded Face	😖	<0.0001	6.3^{a}	4.5^{a}	0.9^{a}	16.2^{b}	2.7^{a}	1.8^{a}	0.0^{a}	0.0^{a}

**p-value of Cochran's Q test with the Marascuilo procedure for pairwise comparisons. Frequencies (%) in the same row with the same superscript are not significantly different at p < 0.05 according to the Marascuilo procedure for pairwise comparisons. Apple® iOS 8.3 emojis used with permission.

TABLE 6.6 SIGNIFICANT DIFFERENCES IN MEAN CHANGE IN EMOJI SELECTION FROM BASELINE ACROSS SAMPLES

Image

Emotion	Emoji	p-value**	Carrots	Cheddar	Chocolate Grahams	Spinach	Lychee Gummy	Orange Juice	Bread	Grapes
Grinning Face		0.0153	0.32^{ab}	0.24^{ab}	0.19^{a}	0.47^{b}	0.32^{ab}	0.16^{a}	0.27^{a}	0.19^{ab}
Face Savouring Delicious Food		0.0287	0.08^{a}	0.04^{a}	-0.01^{a}	0.20^{a}	0.17^{a}	-0.05^{a}	0.10^{a}	0.02^{a}
Angry Face		0.0087	-0.06^{a}	-0.08^{a}	0.00^{a}	-0.01^{a}	-0.07^{a}	-0.04^{a}	-0.01^{a}	-0.02^{a}
Pouting Face		0.0085	-0.05^{ab}	-0.05^{ab}	-0.03^{ab}	-0.01^{b}	-0.11^{a}	-0.02^{ab}	0.00^{b}	0.00^{b}

Appearance

Emotion	Emoji	p-value**	Carrots	Cheddar	Chocolate Grahams	Spinach	Lychee Gummy	Orange Juice	Bread	Grapes
Grinning Face		0.0310	0.10^{ab}	0.05^{ab}	-0.05^{a}	0.05^{ab}	0.24^{b}	0.05^{ab}	0.11^{ab}	0.06^{ab}
Smiling Face With Smiling Eyes		0.0105	0.07^{ab}	0.14^{ab}	0.00^{a}	0.14^{ab}	0.29^{b}	0.03^{a}	0.07^{ab}	0.07^{ab}
Smiling Face With Heart-Shaped Eyes		0.0076	-0.02^{ab}	-0.05^{ab}	-0.13^{ab}	-0.06^{ab}	0.04^{b}	-0.16^{a}	-0.07^{ab}	-0.04^{ab}
Unamused Face		0.0487	-0.05^{a}	-0.04^{a}	0.00^{a}	-0.04^{a}	-0.07^{a}	-0.01^{a}	-0.02^{a}	-0.03^{a}
Worried Face		0.0047	-0.04^{ab}	-0.03^{ab}	0.00^{b}	-0.01^{ab}	-0.08^{a}	-0.01^{ab}	0.01^{b}	0.00^{b}
Confused Face		0.0245	-0.06^{ab}	0.01^{ab}	-0.01^{ab}	-0.05^{ab}	-0.12^{a}	-0.04^{b}	0.02^{b}	-0.01^{ab}
Expressionless Face		0.0152	-0.06^{ab}	0.01^{ab}	0.04^{b}	-0.07^{ab}	-0.14^{a}	-0.03^{ab}	0.00^{ab}	-0.03^{ab}
Crying Face		0.0380	-0.04^{a}	0.00^{a}	0.00^{a}	-0.02^{a}	-0.04^{a}	0.00^{a}	0.00^{a}	-0.02^{a}
Persevering Face		< 0.0001	-0.05^{b}	0.00^{b}	-0.01^{b}	-0.03^{b}	-0.12^{a}	-0.01^{b}	0.00^{b}	-0.01^{b}
Loudly Crying Face		0.0004	-0.04^{ab}	-0.02^{ab}	0.00^{b}	-0.01^{b}	-0.06^{a}	0.00^{b}	0.00^{b}	0.00^{b}
Face Savouring Delicious Food		0.0255	0.00^{ab}	-0.02^{ab}	-0.07^{ab}	0.02^{ab}	0.15^{b}	-0.09^{a}	-0.05^{ab}	0.05^{ab}
Disappointed but Relieved Face		< 0.0001	-0.02^{b}	-0.02^{b}	0.00^{b}	-0.03^{ab}	-0.08^{a}	0.00^{b}	0.00^{b}	0.00^{b}
Face With Open Mouth and Cold Sweat		0.0128	-0.02^{ab}	-0.01^{ab}	0.01^{b}	0.00^{ab}	-0.06^{a}	0.01^{b}	0.01^{b}	0.00^{ab}
Tired Face		< 0.0001	-0.05^{ab}	-0.01^{b}	0.00^{b}	-0.01^{b}	-0.09^{a}	-0.02^{b}	0.00^{b}	0.00^{b}
Fearful Face		0.0165	-0.03^{ab}	-0.04^{ab}	0.00^{b}	-0.03^{ab}	-0.06^{a}	-0.01^{ab}	-0.01^{ab}	0.00^{b}
Face Screaming in Fear		0.0047	-0.01^{b}	-0.02^{ab}	-0.02^{ab}	-0.02^{ab}	-0.10^{a}	0.01^{b}	-0.02^{ab}	-0.02^{ab}
Angry Face		< 0.0001	-0.05^{ab}	0.00^{b}	0.00^{b}	-0.01^{b}	-0.08^{a}	-0.01^{b}	0.00^{b}	0.00^{b}
Confounded Face		< 0.0001	-0.05^{ab}	0.01^{b}	0.00^{b}	-0.03^{b}	-0.13^{a}	-0.02^{b}	0.01^{b}	0.00^{b}

Taste

Emotion	Emoji	p-value**	Carrots	Cheddar	Chocolate Grahams	Spinach	Lychee Gummy	Orange Juice	Bread	Grapes
Grinning Face		0.0038	0.12^{ab}	0.03^{ab}	-0.05^a	0.00^{ab}	0.24^b	-0.03^a	-0.04^a	0.05^{ab}
Smiling Face With Smiling Eyes		0.0158	0.12^{ab}	0.08^{ab}	0.01^a	0.12^{ab}	0.25^b	-0.02^a	0.02^{ab}	0.12^{ab}
Smiling Face With Heart-Shaped Eyes		0.0008	-0.03^{ab}	-0.13^{ab}	-0.15^a	-0.16^a	0.04^b	-0.17^a	-0.14^a	-0.05^{ab}
Frowning Face With Open Mouth		0.0090	-0.03^{ab}	-0.05^{ab}	0.01^b	-0.02^{ab}	-0.08^a	-0.01^{ab}	0.00^b	0.00^b
Flushed Face		< 0.0001	-0.04^b	-0.05^b	-0.02^b	-0.05^{ab}	-0.14^a	0.00^b	0.00^b	-0.03^b
Worried Face		< 0.0001	-0.05^{ab}	-0.02^b	-0.02^b	0.00^b	-0.14^a	0.00^b	0.00^b	-0.01^b
Confused Face		< 0.0001	-0.05^{ab}	-0.01^b	0.01^b	-0.01^b	-0.16^a	0.00^b	0.03^b	0.00^b
Crying Face		0.0028	-0.02^{ab}	-0.02^{ab}	0.00^b	-0.01^b	-0.06^a	0.00^b	0.00^b	-0.02^{ab}
Persevering Face		0.0005	-0.04^{ab}	-0.02^b	0.00^b	-0.06^{ab}	-0.09^a	-0.02^b	0.00^b	-0.02^b
Loudly Crying Face		0.0003	-0.03^{ab}	-0.03^{ab}	0.00^b	0.00^b	-0.07^a	0.00^b	0.00^b	-0.02^{ab}
Face Savouring Delicious Food		0.0484	0.01^{ab}	-0.05^{ab}	-0.10^{ab}	0.00^{ab}	0.11^b	-0.13^a	-0.05^{ab}	-0.02^{ab}
Tired Face		0.0028	-0.02^{ab}	-0.02^{ab}	0.00^b	-0.02^{ab}	-0.06^a	0.00^b	0.00^b	-0.01^b
Angry Face		0.0047	-0.05^{ab}	-0.03^{ab}	-0.01^{ab}	0.00^b	-0.06^a	-0.02^{ab}	0.00^b	-0.01^{ab}
Confounded Face		< 0.0001	-0.05^b	-0.04^b	0.00^b	-0.02^b	-0.15^a	-0.01^b	0.01^b	0.01^b

**p-value of Kruskal-Wallis test. Means in the same row with the same superscript are not significantly different at $p < 0.05$ using the Conover-Iman procedure for multiple pairwise comparisons. Values show the mean change in response from baseline, where a mean of -1 indicates all respondents selected an emotion in response to the stimulus but did not select the emotion at baseline, 0 indicates no change in selection from baseline, and 1 indicates all respondents selected an emotion at baseline but not in response to the stimulus. Apple® iOS 8.3 emojis used with permission.

Table 6.6 summarizes significant differences in mean emoji change from baseline across samples for the three assessment conditions. Significant differences in mean change in emoji selection were observed in the image condition for 4 emojis, and the pairwise comparisons in the image condition highlight differences between the lychee gummy candy and other products. Significant differences in mean change in emoji selection were observed for 18 emojis in the appearance condition and 14 emojis in the taste condition. Angry Face, Face Savouring Delicious Food, and Grinning Face were significantly different in all three conditions. Differences in the appearance and taste conditions are generally characterized by spinach, with spinach showing greater increases in selection of negative emojis as compared to other products, and greater decreases in selection of positive emojis as compared to other stimuli.

Comparison of Emotion Responses Across Assessments

Emotion Words

Significant differences in the frequency of emotion word selection across assessments are provided in Table 6.7. Twenty emotion words were significantly different across assessment conditions for at least one sample. The word pleased was significantly different for three products, with significantly higher selections in the taste condition versus the image condition for cheddar cheese, chocolate graham snacks, and lychee gummy candy. Lychee gummy candy was most impacted by assessment, with significant differences in frequency of word selection across assessment conditions for 15 emotion words. Higher selection frequencies for these words were observed in the appearance and taste conditions as compared to the image assessment. Differences in frequency of word selection were generally observed among positive terms, which had higher selections in the appearance and taste conditions. On the other hand, bored and anger were selected more frequently in the image condition.

TABLE 6.7 SIGNIFICANT DIFFERENCES IN FREQUENCY (%) WORD SELECTION AMONG IMAGE, APPEARANCE, AND TASTE ASSESSMENTS

	Cheddar			
Emotion	p-value**	Image	Appearance	Taste
Pleased	0.0423	11.0^a	18.0^{ab}	24.3^b

	Chocolate Grahams			
Emotion	p-value**	Image	Appearance	Taste
Anger	0.0036	5.0^a	0.0^a	0.0^a
Bored	0.0306	6.0^b	2.7^{ab}	0.0^a
Pleased	0.0132	16.0^a	23.4^{ab}	33.3^b

	Lychee Gummy			
Emotion	p-value**	Image	Appearance	Taste
Calm	0.0212	6.0^a	17.1^b	18.0^b
Cheerful	0.0347	8.0^a	19.8^b	18.9^{ab}
Cool	0.0059	11.0^a	20.7^{ab}	28.8^b
Enjoyment	0.0013	2.0^a	14.4^b	17.1^b
Excited	< 0.0001	2.0^a	21.6^b	24.3^b
Free	0.0237	7.0^a	6.3^a	16.2^a
Glad	< 0.0001	4.0^a	21.6^b	26.1^b
Good	< 0.0001	15.0^a	32.4^b	44.1^b
Happy	< 0.0001	13.0^a	36.0^b	45.9^b
Joyful	0.0066	8.0^a	18.9^{ab}	24.3^b
Peaceful	0.0054	4.0^a	10.8^{ab}	18.0^b
Pleasant	0.0258	6.0^a	9.0^{ab}	17.1^b
Pleased	0.0323	9.0^a	13.5^{ab}	21.6^b
Satisfied	0.0054	6.0^a	17.1^b	21.6^b
Thankful	0.0313	6.0^a	13.5^{ab}	18.0^b

	Orange Juice			
Emotion	p-value**	Image	Appearance	Taste
Active	0.0020	35.0^b	15.3^a	19.8^a
Adventurous	0.0174	22.0^b	9.0^a	11.7^{ab}
Bored	0.0092	8.0^b	0.9^a	1.8^a
Calm	0.0127	34.0^b	17.1^a	21.6^{ab}
Cool	0.0245	37.0^b	21.6^a	23.4^{ab}
Cozy	0.0017	25.0^b	9.0^a	10.8^a

	Grapes			
Emotion	p-value**	Image	Appearance	Taste
Active	0.0082	27.0^b	11.7^a	14.4^{ab}
Adventurous	0.0103	16.0^b	4.5^a	7.2^{ab}
Enjoyment	0.0199	6.0^a	15.3^{ab}	18.9^b

**p-value of chi-square test with the Marascuilo procedure for pairwise comparisons.
Frequencies (%) in the same row with the same superscript are not significantly different at $p <$ 0.05 according to the Marascuilo procedure for pairwise comparisons.

TABLE 6.8 SIGNIFICANT DIFFERENCES IN FREQUENCY (%) OF CHANGE FROM BASELINE EMOTION WORD SELECTION ACROSS ASSESSMENTS

		Carrot			
Emotion	Change from Baseline	p-value**	Image	Appearance	Taste
Active	Decrease	0.0007	19.0[b]	5.4[a]	5.4[a]
Adventurous	Decrease	0.0097	14.0[b]	5.4[ab]	3.6[a]
Free	Decrease	0.0265	19.0[a]	9.0[a]	8.1[a]
Friendly	Decrease	0.0205	28.0[a]	14.4[a]	15.3[a]
Glad	Increase	0.0317	3.0[a]	11.7[b]	12.6[b]
Happy	Increase	0.0120	7.0[a]	16.2[ab]	21.6[b]
Joyful	Increase	0.0286	4.0[a]	14.4[b]	13.5[b]
Joyful	Decrease	0.0239	35.0[a]	20.7[a]	20.7[a]
Pleased	Increase	0.0144	4.0[a]	15.3[b]	15.3[b]
Powerful	Decrease	0.0161	15.0[a]	5.4[a]	5.4[a]

		Cheddar			
Emotion	Change from Baseline	p-value**	Image	Appearance	Taste
Active	Decrease	< 0.0001	22.0[b]	4.5[a]	5.4[a]
Adventurous	Decrease	0.0005	16.0[b]	3.6[a]	3.6[a]
Cheerful	Decrease	0.0440	27.0[a]	14.4[a]	16.2[a]
Enjoyment	Decrease	0.0399	18.0[a]	9.9[a]	7.2[a]
Excited	Increase	0.0167	2.0[a]	9.0[ab]	12.6[b]
Free	Decrease	0.0179	19.0[a]	8.1[a]	8.1[a]
Friendly	Decrease	0.0023	31.0[b]	15.3[a]	13.5[a]
Glad	Increase	0.0010	4.0[a]	15.3[b]	21.6[b]
Happy	Decrease	0.0394	31.0[a]	17.1[a]	19.8[a]
Joyful	Increase	0.0440	6.0[a]	11.7[ab]	17.1[b]
Joyful	Decrease	< 0.0001	38.0[b]	13.5[a]	17.1[a]
Peaceful	Decrease	0.0263	38.0[a]	23.4[a]	23.4[a]
Pleased	Increase	0.0102	4.0[a]	11.7[ab]	17.1[b]
Pleased	Decrease	0.0009	21.0[b]	7.2[a]	6.3[a]
Powerful	Decrease	0.0416	15.0[a]	6.3[a]	6.3[a]

		Chocolate Grahams			
Emotion	Change from Baseline	p-value**	Image	Appearance	Taste
Active	Decrease	< 0.0001	19.0[b]	2.7[a]	3.6[a]
Adventurous	Decrease	0.0025	14.0[b]	4.5[ab]	2.7[a]
Anger	Increase	0.0036	5.0[a]	0.0[a]	0.0[a]
Bored	Increase	0.0171	6.0[b]	1.8[ab]	0.0[a]
Enjoyment	Decrease	< 0.0001	19.0[b]	4.5[a]	2.7[a]
Free	Decrease	0.0008	17.0[b]	5.4[a]	3.6[a]
Friendly	Decrease	< 0.0001	30.0[b]	9.9[a]	9.0[a]
Glad	Decrease	0.0010	31.0[b]	14.4[a]	12.6[a]
Happy	Decrease	0.0003	28.0[b]	10.8[a]	9.9[a]
Joyful	Increase	0.0157	5.0[a]	16.2[b]	17.1[b]
Joyful	Decrease	< 0.0001	34.0[b]	13.5[a]	10.8[a]
Peaceful	Decrease	0.0238	33.0[b]	22.5[ab]	17.1[a]
Pleased	Increase	0.0006	5.0[a]	17.1[b]	24.3[b]
Pleased	Decrease	0.0050	17.0[b]	7.2[ab]	4.5[a]
Powerful	Decrease	0.0235	13.0[a]	4.5[a]	4.5[a]
Satisfied	Increase	0.0366	7.0[a]	12.6[ab]	18.9[b]
Thankful	Decrease	0.0405	22.0[a]	11.7[a]	10.8[a]

		Spinach			
Emotion	Change from Baseline	p-value**	Image	Appearance	Taste
Active	Decrease	0.0001	24.0[b]	7.2[a]	7.2[a]
Adventurous	Decrease	0.0015	18.0[b]	5.4[a]	5.4[a]
Amazed	Decrease	0.0306	18.0[a]	7.2[a]	9.0[a]

Emotion	Change from Baseline	p-value**	Image	Appearance	Taste
Cheerful	Decrease	0.0049	34.0[b]	18.0[a]	17.1[a]
Enjoyment	Decrease	0.0308	21.0[b]	9.0[a]	11.7[ab]
Free	Decrease	0.0116	21.0[b]	9.0[a]	9.0[a]
Friendly	Decrease	0.0052	31.0[b]	15.3[a]	15.3[a]
Joyful	Decrease	0.0051	39.0[b]	21.6[a]	21.6[a]
Pleased	Decrease	0.0035	24.0[b]	10.8[a]	9.0[a]

Lychee Gummy

Emotion	Change from Baseline	p-value**	Image	Appearance	Taste
Active	Decrease	< 0.0001	28.0[b]	6.3[a]	3.6[a]
Adventurous	Decrease	< 0.0001	19.0[b]	4.5[a]	2.7[a]
Amazed	Decrease	0.0140	17.0[b]	8.1[ab]	5.4[a]
Cheerful	Increase	0.0232	3.0[a]	13.5[b]	11.7[b]
Cheerful	Decrease	< 0.0001	34.0[b]	13.5[a]	12.6[a]
Cool	Increase	0.0394	7.0[a]	15.3[ab]	18.9[b]
Cool	Decrease	0.0064	27.0[b]	15.3[ab]	10.8[a]
Enjoyment	Increase	0.0121	1.0[a]	9.9[b]	10.8[b]
Enjoyment	Decrease	0.0020	22.0[b]	9.0[a]	7.2[a]
Excited	Increase	0.0026	1.0[a]	12.6[b]	13.5[b]
Excited	Decrease	0.0155	39.0[b]	24.3[ab]	22.5[a]
Free	Decrease	0.0007	20.0[b]	8.1[a]	4.5[a]
Friendly	Decrease	< 0.0001	33.0[b]	14.4[a]	10.8[a]
Glad	Increase	0.0017	0.0[a]	9.0[b]	12.6[b]
Glad	Decrease	< 0.0001	38.0[b]	14.4[a]	13.5[a]
Good	Increase	0.0012	2.0[a]	9.9[b]	17.1[b]
Good	Decrease	0.0013	38.0[b]	21.6[a]	17.1[a]
Happy	Increase	0.0092	5.0[a]	15.3[b]	18.9[b]
Happy	Decrease	< 0.0001	40.0[b]	18.0[a]	11.7[a]
Joyful	Decrease	< 0.0001	44.0[b]	15.3[a]	12.6[a]
Peaceful	Increase	0.0356	0.0[a]	1.8[ab]	5.4[b]
Peaceful	Decrease	0.0015	43.0[b]	25.2[a]	21.6[a]
Pleasant	Decrease	0.0220	22.0[b]	12.6[ab]	9.0[a]
Pleased	Increase	0.0014	2.0[a]	10.8[b]	17.1[b]
Pleased	Decrease	0.0237	21.0[b]	10.8[ab]	9.0[a]
Powerful	Decrease	0.0249	17.0[a]	6.3[a]	8.1[a]
Satisfied	Increase	0.0179	4.0[a]	14.4[.b]	15.3[b]
Thankful	Decrease	0.0410	26.0[a]	15.3[a]	13.5[a]

Orange Juice

Emotion	Change from Baseline	p-value**	Image	Appearance	Taste
Bored	Increase	0.0020	7.0[b]	0.0[a]	0.9[ab]
Cheerful	Decrease	0.0148	25.0[b]	11.7[a]	12.6[ab]
Cozy	Increase	0.0019	20.0[b]	6.3[a]	7.2[a]
Enjoyment	Increase	0.0410	6.0[a]	7.2[a]	15.3[a]
Enjoyment	Decrease	0.0495	14.0[a]	6.3[a]	5.4[a]
Free	Decrease	0.0171	17.0[a]	7.2[a]	6.3[a]
Joyful	Decrease	0.0052	26.0[b]	12.6[a]	10.8[a]
Pleased	Increase	0.0274	9.0[a]	18.9[ab]	22.5[b]
Pleased	Decrease	0.0486	18.0[a]	10.8[a]	7.2[a]

Bread

Emotion	Change from Baseline	p-value**	Image	Appearance	Taste
Active	Decrease	< 0.0001	25.0[b]	5.4[a]	4.5[a]
Adventurous	Decrease	0.0004	17.0[b]	4.5[a]	3.6[a]
Amazed	Decrease	0.0076	16.0[b]	5.4[a]	5.4[a]
Bored	Increase	0.0007	8.0[b]	0.0[a]	0.9[a]
Cheerful	Decrease	0.0018	27.0[b]	10.8[a]	11.7[a]
Cool	Decrease	0.0405	22.0[a]	11.7[a]	10.8[a]
Enjoyment	Increase	0.0338	4.0[a]	9.0[ab]	14.4[b]

Emotion	Change from Baseline	p-value**	Image	Appearance	Taste
Enjoyment	Decrease	0.0164	19.0[b]	7.2[a]	9.0[ab]
Free	Decrease	0.0009	17.0[b]	4.5[a]	4.5[a]
Friendly	Decrease	< 0.0001	26.0[b]	8.1[a]	8.1[a]
Glad	Decrease	0.0186	27.0[b]	13.5[a]	14.4[ab]
Good	Decrease	0.0565	28.0[a]	18.0[a]	15.3[a]
Happy	Decrease	0.0051	33.0[b]	18.9[ab]	15.3[a]
Joyful	Increase	0.0449	4.0[a]	12.6[ab]	13.5[b]
Joyful	Decrease	< 0.0001	32.0[b]	10.8[a]	10.8[a]
Peaceful	Decrease	0.0485	34.0[a]	20.7[a]	21.6[a]
Pleased	Increase	0.0115	6.0[a]	19.8[b]	17.1[b]
Pleased	Decrease	0.0330	16.0[a]	6.3[a]	7.2[a]
Powerful	Decrease	0.0189	14.0[a]	5.4[a]	4.5[a]
Grapes					
Emotion	Change from Baseline	p-value**	Image	Appearance	Taste
Active	Decrease	0.0008	17.0[b]	5.4[a]	3.6[a]
Adventurous	Decrease	0.0022	16.0[b]	4.5[a]	4.5[a]
Enjoyment	Increase	0.0164	2.0[a]	9.9[b]	12.6[b]
Enjoyment	Decrease	0.0112	19.0[b]	8.1[ab]	7.2[a]
Free	Decrease	0.0006	19.0[b]	6.3[a]	4.5[a]
Friendly	Decrease	0.0009	30.0[b]	12.6[a]	12.6[a]
Happy	Decrease	0.0436	26.0[a]	14.4[a]	14.4[a]
Joyful	Decrease	0.0004	30.0[b]	14.4[a]	9.9[a]
Peaceful	Decrease	0.0119	36.0[b]	22.5[ab]	18.9[a]
Pleased	Increase	0.0249	5.0[a]	16.2[b]	15.3[b]
Pleased	Decrease	0.0003	20.0[b]	5.4[a]	5.4[a]

**p-value of chi-square test with the Marascuilo procedure for pairwise comparisons. Frequencies (%) in the same row with the same superscript are not significantly different at p < 0.05 according to the Marascuilo procedure for pairwise comparisons.

Significant differences in frequency of change from baseline emotion for at least one sample were observed for 22 emotion words, as shown in Table 6.7Table 6.8. As with the analysis on raw CATA data, significant differences in frequency were mostly observed for positive emotion terms. The words pleased, joyful, and enjoyment had several significant differences, characterized by greater increases from baseline in the taste condition as compared to the image condition, and greater decreases from baseline in the image condition as compared to the taste condition. Significant differences were also observed in the increased use of the term bored for well-liked products (chocolate graham snacks, orange juice, white bread) in the image condition.

Emojis

Table 6.9 shows the significant differences in frequency of emoji selection within

samples compared across the assessment conditions. Twenty-one emojis were significantly

TABLE 6.9 SIGNIFICANT DIFFERENCES IN FREQUENCY (%) OF EMOJI SELECTION AMONG IMAGE, APPEARANCE, AND TASTE ASSESSMENTS

Carrot					
Emotion	Emoji	p-value**	Image	Appearance	Taste
Face Without Mouth		0.0015	18.0^b	5.4^a	5.4^a
Grimacing Face		0.0073	11.0^b	3.6^{ab}	1.8^a
Face Screaming in Fear		0.0499	8.0^a	1.8^a	2.7^a

Cheddar					
Emotion	Emoji	p-value**	Image	Appearance	Taste
Face Without Mouth		0.0228	17.0^b	9.9^{ab}	5.4^a
Persevering Face		0.0430	5.0^a	0.0^a	1.8^a
Tired Face		0.0092	8.0^b	0.9^a	1.8^{ab}
Angry Face		0.0053	8.0^b	0.0^a	2.7^{ab}
Confounded Face		0.0027	10.0^b	0.0^a	4.5^{ab}

Chocolate Grahams					
Emotion	Emoji	p-value**	Image	Appearance	Taste
Face Without Mouth		0.0175	11.0^b	5.4^{ab}	1.8^a
Frowning Face With Open Mouth		0.0011	6.0^b	0.0^a	0.0^a
Flushed Face		0.0452	7.0^a	0.9^a	2.7^a

Lychee Gummy					
Emotion	Emoji	p-value**	Image	Appearance	Taste
Grinning Face		< 0.0001	10.0^a	40.5^b	45.9^b
Smiling Face With Smiling Eyes		0.0083	13.0^a	27.9^b	29.7^b
Smiling Face		0.0060	11.0^a	21.6^{ab}	28.8^b
Face Without Mouth		0.0065	19.0^b	8.1^{ab}	6.3^a
Winking Face		0.0049	7.0^a	18.0^b	23.4^b
Smiling Face With Heart-Shaped Eyes		0.0015	7.0^a	15.3^{ab}	25.2^b
Face With Stuck-Out Tongue		0.0109	8.0^a	22.5^b	20.7^b
Relieved Face		0.0003	6.0^a	18.9^b	27.0^b
Face Savouring Delicious Food		0.0300	13.0^a	25.2^{ab}	27.0^b
Smiling Face With Sunglasses		0.0042	7.0^a	21.6^b	22.5^b

Orange Juice					
Emotion	Emoji	p-value**	Image	Appearance	Taste
Unamused Face		0.0452	7.0^a	0.9^a	2.7^a
Crying Face		0.0347	3.0^a	0.0^a	0.0^a

Emotion	Emoji	p-value**	Image	Appearance	Taste
Loudly Crying Face	😭	0.0347	3.0[a]	0.0[a]	0.0[a]

		Bread			
Emotion	Emoji	p-value**	Image	Appearance	Taste
Grinning Face	😀	0.0095	30.0[a]	35.1[ab]	49.5[b]
Face Without Mouth	😶	0.0194	16.0[b]	7.2[ab]	5.4[a]
Grimacing Face	😬	0.0378	10.0[a]	3.6[a]	2.7[a]

**p-value of chi-square test with the Marascuilo procedure for pairwise comparisons. Frequencies (%) in the same row with the same superscript are not significantly different at p < 0.05 according to the Marascuilo procedure for pairwise comparisons. Apple® iOS 8.3 emojis used with permission.

different for at least one sample. The emoji Face Without Mouth had significantly higher selections in the image evaluation as compared to the taste evaluation for baby carrots, cheddar cheese, chocolate graham snacks, lychee gummy candy, and white bread. Significant differences for positive emojis were generally characterized by higher selection in the appearance and taste conditions, while negative emojis were selected more frequently in the image study. As observed with emotion words, lychee gummy candy was most impacted by the assessment condition, with 10 emojis significantly different across assessments.

Table 6.10 shows the significant differences in frequency of change from baseline for emoji selection within a sample, compared across assessment conditions. Twenty-two emojis were significantly different in their change in response across assessment conditions for at least one sample. As observed with emotion words, positive emojis tended to have greater decreases in selection from baseline in the image condition, while negative emojis had greater increases in selection in the image condition. Smiling Face With Heart-Shaped Eyes was significantly different for several samples, with significantly higher decrease from baseline selection in the image condition as compared to the appearance and taste conditions for fresh spinach, lychee gummy candy, orange juice, white bread, and white grapes.

TABLE 6.10 SIGNIFICANT DIFFERENCES IN FREQUENCY (%) OF CHANGE FROM BASELINE EMOJI SELECTION ACROSS ASSESSMENTS

Emotion	Emoji	Change from Baseline	p-value**	Image	Appearance	Taste
Carrot						
Grinning Face	😃	Decrease	0.0057	41.0[b]	26.1[ab]	21.6[a]
Face Without Mouth	😶	Increase	0.0189	14.0[a]	4.5[a]	5.4[a]
Smiling Face With Heart-Shaped Eyes	😍	Decrease	0.0061	17.0[b]	6.3[ab]	5.4[a]
Unamused Face	😒	Decrease	0.0347	3.0[a]	0.0[a]	0.0[a]
Grimacing Face	😬	Increase	0.0141	9.0[b]	3.6[ab]	0.9[a]
Smiling Face With Sunglasses	😎	Decrease	0.0395	29.0[a]	16.2[a]	17.1[a]
Face Screaming in Fear	😱	Increase	0.0249	8.0[a]	1.8[a]	1.8[a]
Cheddar						
Grinning Face	😃	Decrease	0.0221	34.0[b]	22.5[ab]	18.0[a]
Winking Face	😉	Decrease	0.0150	28.0[a]	14.4[a]	14.4[a]
Smiling Face With Heart-Shaped Eyes	😍	Decrease	0.0089	15.0[b]	4.5[a]	5.4[ab]
Unamused Face	😒	Decrease	0.0347	3.0[a]	0.0[a]	0.0[a]
Persevering Face	😣	Increase	0.0430	5.0[a]	0.0[a]	1.8[a]
Tired Face	😫	Increase	0.0092	8.0[b]	0.9[a]	1.8[ab]
Smiling Face With Sunglasses	😎	Decrease	0.0116	30.0[b]	14.4[a]	17.1[ab]
Angry Face	😠	Increase	0.0053	8.0[b]	0.0[a]	2.7[ab]
Confounded Face	😖	Increase	0.0027	10.0[b]	0.0[a]	4.5[ab]
Chocolate Grahams						
Grinning Face	😃	Decrease	0.0041	31.0[b]	13.5[a]	17.1[ab]
Smiling Face With Smiling Eyes	😊	Decrease	0.0092	30.0[b]	13.5[a]	18.0[ab]
Smiling Face	😌	Decrease	0.0167	26.0[b]	13.5[ab]	12.6[a]
Winking Face	😉	Increase	0.0431	9.0[a]	12.6[a]	20.7[a]
Winking Face	😉	Decrease	0.0405	22.0[a]	10.8[a]	11.7[a]
Frowning Face With Open Mouth	😦	Increase	0.0011	6.0[b]	0.0[a]	0.0[a]
Face With Stuck-Out Tongue	😛	Increase	0.0134	5.0[a]	15.3[b]	18.0[b]
Unamused Face	😒	Decrease	0.0112	4.0[a]	0.0[a]	0.0[a]
Smiling Face With Sunglasses	😎	Decrease	0.0023	29.0[b]	14.4[a]	11.7[a]
Spinach						
Smiling Face With Smiling Eyes	😊	Increase	0.0122	11.0[b]	1.8[a]	4.5[ab]
Smiling Face With Heart-Shaped Eyes	😍	Decrease	0.0010	20.0[b]	5.4[a]	7.2[a]

Emotion	Emoji	Change from Baseline	p-value**	Image	Appearance	Taste
Flushed Face	😳	Decrease	0.0112	4.0^a	0.0^a	0.0^a
Unamused Face	😒	Decrease	0.0347	3.0^a	0.0^a	0.0^a
Smiling Face With Sunglasses	😎	Decrease	0.0485	34.0^a	21.6^a	20.7^a

Lychee Gummy

Emotion	Emoji	Change from Baseline	p-value**	Image	Appearance	Taste
Grinning Face	😄	Increase	0.0227	5.0^a	13.5^{ab}	17.1^b
Grinning Face	😄	Decrease	< 0.0001	52.0^b	18.9^a	17.1^a
Smiling Face With Smiling Eyes	😊	Decrease	0.0078	39.0^b	24.3^{ab}	20.7^a
Smiling Face	☺	Decrease	0.0002	33.0^b	15.3^a	11.7^a
Face Without Mouth	😶	Increase	0.0495	14.0^a	6.3^a	5.4^a
Winking Face	😉	Decrease	0.0007	32.0^b	15.3^a	12.6^a
Smiling Face With Heart-Shaped Eyes	😍	Increase	0.0026	3.0^a	13.5^b	18.0^b
Smiling Face With Heart-Shaped Eyes	😍	Decrease	< 0.0001	19.0^b	7.2^a	1.8^a
Face With Stuck-Out Tongue	😛	Decrease	0.0022	28.0^b	11.7^a	12.6^a
Relieved Face	😌	Decrease	0.0006	33.0^b	15.3^a	13.5^a
Unamused Face	😒	Decrease	0.0112	4.0^a	0.0^a	0.0^a
Face Savouring Delicious Food	😋	Decrease	0.0093	28.0^b	15.3^{ab}	12.6^a
Smiling Face With Sunglasses	😎	Increase	0.0115	0.0^a	7.2^b	9.0^b
Smiling Face With Sunglasses	😎	Decrease	< 0.0001	37.0^b	13.5^a	14.4^a

Orange Juice

Emotion	Emoji	Change from Baseline	p-value**	Image	Appearance	Taste
Smiling Face With Heart-Shaped Eyes	😍	Decrease	0.0005	16.0^b	3.6^a	3.6^a
Unamused Face	😒	Decrease	0.0347	3.0^a	0.0^a	0.0^a
Crying Face	😢	Increase	0.0347	3.0^a	0.0^a	0.0^a
Loudly Crying Face	😭	Increase	0.0347	3.0^a	0.0^a	0.0^a
Pouting Face	😡	Decrease	0.3284	1.0^a	0.0^a	0.0^a
Confounded Face	😖	Decrease	0.6355	0.0^a	0.9^a	0.9^a

Bread

Emotion	Emoji	Change from Baseline	p-value**	Image	Appearance	Taste
Grinning Face	😄	Decrease	< 0.0001	39.0^c	23.4^b	10.8^a
Smiling Face With Smiling Eyes	😊	Decrease	0.0374	30.0^a	18.9^a	16.2^a
Smiling Face	☺	Decrease	0.0148	25.0^b	12.6^{ab}	11.7^a
Winking Face	😉	Decrease	0.0331	24.0^b	15.3^{ab}	10.8^a
Smiling Face With Heart-Shaped Eyes	😍	Increase	0.0081	6.0^a	10.8^{ab}	19.8^b
Smiling Face With Heart-Shaped Eyes	😍	Decrease	0.0019	16.0^b	3.6^a	5.4^a
Face With Stuck-Out Tongue	😛	Decrease	0.0424	22.0^a	9.9^a	13.5^a

Emotion	Emoji	Change from Baseline	p-value**	Image	Appearance	Taste
Unamused Face	😒	Decrease	0.0112	4.0[a]	0.0[a]	0.0[a]
Smiling Face With Sunglasses	😎	Decrease	0.0016	29.0[b]	13.5[a]	11.7[a]
Grapes						
Emotion	Emoji	Change from Baseline	p-value**	Image	Appearance	Taste
Grinning Face	😀	Decrease	0.0129	34.0[b]	18.9[a]	18.9[a]
Smiling Face With Heart-Shaped Eyes	😍	Decrease	0.0416	15.0[a]	6.3[a]	6.3[a]
Unamused Face	😒	Decrease	0.0347	3.0[a]	0.0[a]	0.0[a]

**p-value of chi-square test with the Marascuilo procedure for pairwise comparisons. Frequencies (%) in the same row with the same superscript are not significantly different at p < 0.05 according to the Marascuilo procedure for pairwise comparisons. Apple® iOS 8.3 emojis used with permission.

Emotions and Liking

Results from the forward regression procedure for the image, appearance, taste, and combined data sets to predict child liking are provided in Table 6.11. The lists of significant emotion words and emojis (p < 0.20) include 18 words and 16 emojis for the combined data set, 13 words and 14 emojis for the image data, 18 words and 9 emojis for the appearance data, and 8 words and 11 emojis for the taste data. Each resulting model contained a mixture of positive and negative words and emojis as predictors of liking response, although the model obtained from the analysis of post-taste emotion responses had a greater proportion of negative words and emojis as compared to the image and appearance assessment models. Terms identified by children as positive-neutral, as discussed in a previous publication (Gallo *et al.* 2017b), were only significant in the emotion set derived from the analysis of product appearance emotions.

TABLE 6.11 LIST OF SIGNIFICANT (P < 0.20) WORDS AND EMOJIS USING FORWARD REGRESSION TO PREDICT LIKING (APPLE® IOS 8.3 EMOJIS USED WITH PERMISSION).

Words			
Combined Data	**Image**	**Appearance**	**Taste**
Active	Active	Active	
Amazed	Amazed	Amazed	Amazed
Anger	Anger	Anger	Anger
Bad	Bad	Bad	Bad
	Bored		
		Calm	
Cheerful			
Cool		Cool	
Disappointed		Disappointed	Disappointed
Disgusted	Disgusted	Disgusted	Disgusted
	Enjoyment		
Excited		Excited	
Free			
Friendly	Friendly	Friendly	
			Glad
Good	Good	Good	Good
Happy	Happy	Happy	
Joyful			Joyful
Pleasant		Pleasant	
		Pleased	
Powerful		Powerful	
		Sad	
Satisfied	Satisfied	Satisfied	
Thankful	Thankful	Thankful	
	Upset		

Emojis				
Emoji	**Combined Data**	**Image**	**Appearance**	**Taste**
😠	Angry Face			
😖	Confounded Face			Confounded Face
🙁	Confused Face			Confused Face
😢			Crying Face	
😥		Disappointed but Relieved Face	Disappointed but Relieved Face	
😑	Expressionless Face		Expressionless Face	Expressionless Face
😱	Face Screaming in Fear	Face Screaming in Fear		
😰	Face With Open Mouth and Cold Sweat	Face With Open Mouth and Cold Sweat		
😶		Face Without Mouth		
😛		Face With Stuck-Out Tongue		
😨	Fearful Face	Fearful Face		
😳	Flushed Face			Flushed Face

😦	Frowning Face With Open Mouth	Frowning Face With Open Mouth		
😬		Grimacing Face		
😀	Grinning Face	Grinning Face	Grinning Face	Grinning Face
😣	Persevering Face	Persevering Face		Persevering Face
😡	Pouting Face		Pouting Face	Pouting Face
😌	Relieved Face	Relieved Face	Relieved Face	
😍	Smiling Face With Heart-Shaped Eyes		Smiling Face With Heart-Shaped Eyes	Smiling Face With Heart-Shaped Eyes
😎	Smiling Face With Sunglasses	Smiling Face With Sunglasses		Smiling Face With Sunglasses
😫	Tired Face	Tired Face	Tired Face	Tired Face
😒			Unamused Face	
🙁		Worried Face		Worried Face

Discussion

When considering the differences in emoji selection among the study samples, fewer significant differences were observed in the image condition as compared to the taste and appearance assessments (Table 6.3, Table 6.4). With emotion words, the overall number of terms which were significantly different did not largely differ across the three assessment methods (Table 6.5, Table 6.6). This may suggest that the assessment of emotion using a pictorial emoji in the evaluation of food images may be too abstract of a task for children within this age group. Further research is needed to understand whether this observation holds for more similar samples within a food category amongst children who are target product consumers.

Overall, positive words and emojis were selected with greater frequency in the appearance and taste assessment conditions as compared to responses from the image assessment. On the other hand, negative words and emojis were selected more frequently in the image condition versus the appearance and taste conditions. Additionally, liking scores in response to the product image were lower than overall liking scores in response to tasting the

product. Responses generated from image evaluation were more negative overall. In research with adult participants, Cardello *et al.* (2012) observed greater emotional responses when evaluating a product name versus tasting the food for highly emotional foods (e.g. chocolate), while with low emotion foods (e.g. oatmeal), the emotional responses are greater when evaluating the tasted food. The overall negative skew of results observed in the present image assessment may be in part due to children's desire to interact with the foods. Several children who participated in the image test expressed disappointment when the research staff clarified that there would be no tasting involved in the study.

One limitation of this study is the wide range of foods that were used in testing. More often, researchers are interested in determining whether or not differences exist within a category, among products that are more similar than the items included in this study. Therefore, concerns about differences in the findings may be greater for those looking to understand samples that may be more similar than those provided in this study. In considering a more similar set of products, researchers may be able to further narrow the words and emojis used to those most relevant for the product category, as identified through pre-testing. For a reduced set of words and emojis, a rating scale may be suitable for emotion assessment as opposed to the CATA approach used in the present research, which would allow further differentiation of children's emotion responses to products.

Of the samples presented, lychee gummy candy responses were the most impacted by the type of assessment (image, appearance, or taste), with lower emotion word and emojis selections in the image condition. For products that were more familiar to children, such as orange juice, emotion responses were more stable when comparing the three assessment approaches. Some differences in emotion word or emoji selection for lychee gummy candy may be influenced by

the manner in which the sample was presented. While the product wrapper was included in the image of the candy to provide context and encourage selection of words and emojis related to unfamiliar or foreign foods, selections of words and emojis for the gummy candy were low as compared to other samples in the image condition. Brand information can influence consumer acceptability (Cardello *et al.* 1996). Brand can also influence emotion responses. In a study with children, researchers observed greater positive emotion responses toward familiar milk brands versus unfamiliar brands (De Pelsmaeker *et al.* 2013). This research only considered whether or not children had tried a food before, and not the child's frequency of product use. Further research may explore the stability of children's emotion responses between assessment types among heavy users. For product testing among children who are unfamiliar with the study sample, it is recommended that actual foods be used for testing.

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Chapter 7 - Emotional Drivers of Favorite and Disliked Foods in Children

Abstract

The purpose of this research was to understand children's emotion responses to self-selected favorite and disliked foods. Three studies were considered in the present research: a food image study in the United States, a food appearance study in the United States, and a food image study in Ghana. In all three studies, children indicated their favorite and disliked foods and provided emotion responses to these foods using emotion words and emojis in a check-all-that-apply (CATA) question. These emotion CATA questions were also assessed for 8 products (baby carrots, cheddar cheese cubes, chocolate graham snacks, fresh spinach, lychee gummy candy, orange juice, white bread, and white grapes), along with sample liking and familiarity. Overall, positive emotions were important in characterizing children's responses to their favorite foods, while negative words and emojis were used to explain feelings in response to a disliked food. A cluster analysis of liking responses yielded four consumer clusters. Positive emotion selections were important for all four clusters of respondents, although specific emotion words and emojis related to the favorite food experience differed by cluster. From the penalty analysis of the CATA responses the emotion word happy, and the emojis Face Savouring Delicious Food, and Smiling Face with Smiling Eyes were "must have" emotions for all four clusters. This research suggests that higher frequency of positive emotion word and emoji responses are critical in achieving a "favorite food" experience with children.

Introduction

With continued growth in the consumer sciences, it is necessary to conduct research with populations that extend beyond the often studied adult consumers. Children in the United States, while having limited income, play an important role in food purchase decisions within the household (Mintel 2016). On a global scale, food is an important category for children as consumers. In a survey of children aged 4 to 12 years in Hong Kong, Taiwan, New Zealand, and the United States, food was the primary category for income expenditure, topping other categories, such as play items and entertainment (McNeal *et al.* 1993). To meet the needs of this market, it is necessary to understand the factors that influence children's food preferences and choices. Bower and Sandall (2002) reported that children 7 to 8 years old identified taste as a key factor in both liking and disliking of snack foods. For school lunch choices, which parents reported as a joint decision between parent and child, children were most influenced by overall menu and taste in making their decisions (Meyer *et al.* 2002). Rejection of foods is also a concern when considering children's food behavior. Issues with picky eating and food neophobia are more common in child populations, but these problems tend to decline with age (Dovey *et al.* 2008). Among students in California, school lunch menu changes to adhere to new national school meal nutrition standards, menu changes were supported by students, but many students eating the meals did not consume the entire served meal (Okey 2012). Further understanding of factors related to children's food likes and dislikes can help researchers better meet the needs of child consumers.

Recently, the impact of food on emotions has become a key focus area within the consumer sciences. Food-related emotions provide information beyond liking or disliking, and these emotions can provide further insights to understand consumer choice behavior (Gutjar *et*

al. 2015). In a university food court setting, positive emotions related to higher acceptability, and consumption of a hot meal yielded an increase in lethargic emotions (Edwards *et al.* 2013). In another study, undergraduate students reported different emotions experienced before and after a lunch time meal, and attributed these changes in emotion to factors such as food quality and perceived healthiness of meal components (Brown *et al*. 2013). While the majority of the emotion research has focused on adult subjects, some researchers have studied emotion assessment with children. A word-based check-all-that-apply (CATA) emotion tool was developed to understand children's emotions related to flavored and unflavored milk (De Pelsmaeker *et al.* 2013), but there remains a need for research that applies to a broader range of children's consumption experiences.

Another important element to be considered in the development of consumer emotion methods is the role of culture. Culture impacts the way consumers use emotion words, so it is essential to conduct cross-cultural research when using consumer emotion tools which are intended to be used with more than one cultural group (van Zyl and Meiselman 2015; van Zyl and Meiselman 2016). Beyond language differences that may exist, culture has an important influence on consumer responses in sensory testing (Ramaroson Rakotosamimanana *et al.* 2015). Ferdenzi and colleagues (2011) also noted the importance of investigating cultural differences in affective responses. Although these researchers observed overlapping dimensions in affective response to odor stimuli among the cultures studied, culture-specific affective states were important in differentiating odorants. Ghana is an area of particular interest in cross-cultural consumer testing with children for several reasons. Firstly, overall population of Ghana has grown in recent years, and more than a third of the population is under 15 years old (Ghana Statistical Service 2012), representing a key opportunity within an emerging marketplace. On

average, food and beverage expenditures account for half of household consumption in Ghanaian households (The World Bank Group 2016). In addition, although regional dialects are common in Ghana, English is the official language of the country, allowing for cross-cultural comparisons of emotion study results without language differences between the sample populations.

The objective of this research was to understand key emotions related to children's favorite and disliked foods and beverages. Responses from children aged 7 to 12 years were obtained in 3 separate studies conducted in the United States and Ghana. Findings from this research will be used to identify emotions, expressed through words or emojis, to target or avoid in foods and beverages.

Materials and Methods

Three studies were conducted to assess children's food-related emotion responses. Two studies were conducted in Olathe, Kansas, USA and one was fielded in Accra, Ghana. Children were asked to assess two self-selected foods or beverages (favorite and disliked) using emotion words and emojis in a CATA format. Additionally, respondents were asked to assess 8 different samples using the same words and emojis: baby carrots, cheddar cheese cubes, chocolate graham snacks, fresh spinach, lychee gummy candy, orange juice, white bread, and white grapes. In Ghana and the first U.S. study, participants evaluated photographs of food. In the second U.S. study, children provided their response based on looking at samples of the same foods. The emotion words and emojis used were identified previously through qualitative and quantitative research (see Chapters 3 & 4 for further details). The Apple[®] iOS 8.3 emojis (used with permission) included in this study will be referred to by their Unicode name throughout the discussion (Unicode 2016). Table 7.1 shows the 28 emojis and 28 emotions words used in all three studies.

TABLE 7.1 EMOJIS AND EMOTION WORDS USED IN U.S. FOOD IMAGE, U.S. FOOD APPEARANCE, AND GHANA FOOD IMAGE STUDIES (APPLE IOS 8.3 EMOJIS USED WITH PERMISSION).

Emojis						Words		
😀	Grinning Face	😒	Unamused Face	😰	Face With Open Mouth and Cold Sweat	Active	Disappointed	Joyful
😊	Smiling Face With Smiling Eyes	😟	Worried Face	😩	Tired Face	Adventurous	Disgusted	Peaceful
☺	Smiling Face	😕	Confused Face	😨	Fearful Face	Amazed	Enjoyment	Pleasant
😉	Winking Face	😑	Expressionless Face	😎	Smiling Face With Sunglasses	Anger	Excited	Pleased
😶	Face Without Mouth	😣	Persevering Face	😬	Grimacing Face	Bad	Free	Powerful
😍	Smiling Face With Heart-Shaped Eyes	😢	Crying Face	😱	Face Screaming in Fear	Bored	Friendly	Sad
😦	Frowning Face With Open Mouth	😭	Loudly Crying Face	😠	Angry Face	Calm	Glad	Satisfied
😛	Face With Stuck-Out Tongue	😋	Face Savouring Delicious Food	😡	Pouting Face	Cheerful	Good	Thankful
😳	Flushed Face	😥	Disappointed but Relieved Face	😖	Confounded Face	Cool	Happy	Upset
😌	Relieved Face					Cozy		

Study 1: U.S. Food Images

Children (n=100) ages 7 to 11 were recruited through their parents or legal guardians in the participant database at the Sensory & Consumer Research Center (Olathe, Kansas, USA). Participants were selected to achieve an even distribution in age and gender. Children who had previously participated in related research were ineligible to participate in this study.

Participants completed the study at the Sensory & Consumer Research Center on iPads using Compusense at-Hand (Compusense Inc., Guelph, Ontario, Canada). Upon arrival at the facility, the parent or legal guardian and the child read and signed a study consent form. Prior to beginning the questionnaire, a moderator explained the study procedure and examples of questions included in the survey. Children completed two open-ended questions to indicate their favorite food or beverage and a disliked food or beverages. These typed responses were piped into CATA questions asking how these foods make them feel, first using emotion words, and then using emojis. Photographs of the eight foods were shown in a sequential monadic manner. After seeing each food, children answered four questions: whether they had previously tried the food/beverage (yes/no), image liking [9-point Peryam & Kroll super good-super bad scale (Kroll 1990)], emotion word CATA, and emoji CATA. Between each sample, a break screen was shown to introduce participants to the next sample and to provide a transition in the questionnaire.

Study 2: U.S. Food Appearance

One-hundred and eleven children (7 to 11 years) were recruited for the second study. Parents and legal guardians from a consumer database completed an online screener about their child. Participants in study 1 were not eligible to participate in this study. All participants were

screened to have no food allergies or dietary restrictions. Based on parent or guardian feedback, all children were at least willing to try all 8 foods included in the study.

Sessions were held on campus at Kansas State University – Olathe Campus. Foods served in this study were the same as those photographed for study 1. All parents or guardians and child participants read and signed a study consent form before the start of the study. At the beginning of each session, a moderator explained the study to participants and provided examples of questions on the survey. As in study 1, the online questionnaire began with children's self-selected favorite and disliked foods, followed by emotion word and emoji CATA questions about these items. Samples were served in a sequential monadic manner with a timed 30-second break, during which time children were instructed to take a bite of unsalted top cracker and drink water for palate cleansing. Children answered 7 questions for each sample: whether or not they had previously tried the product (yes/no), appearance liking (9-point Peryam & Kroll super good-super bad scale), pre-taste emotion word CATA, pre-taste emoji CATA, post-taste liking (9-point Peryam & Kroll super good-super bad scale), post-taste emotion word CATA, and post-taste emoji CATA. To compare results from this study with results from the two image-based studies, only the appearance liking and pre-taste emotions were included in the data analysis.

Study 3: Ghana Food Images

All testing in Ghana took place in local schools. Schools were contacted and briefed on the study plans by a local collaborator. Schools were selected to include a range of income levels. Permission forms containing study details were sent home with children to be signed by the parent or guardian. The Institutional Review Board agreement for the research in Ghana did not allow for testing with children younger than 12 years. Therefore, participants were screened

on-site to include only children who were 12 years old on the day of the study. Although the research agreement allowed for testing with children older than 12 years, the choice was made to include only 12-year-olds to minimize age differences between the American and Ghanaian participants. Prior to beginning the questionnaire, children were instructed to read and sign a consent form detailing the structure of the study. A total of 120 children participated in the study.

The questionnaire structure used in study 1 and study 2 was adapted to a paper ballot for testing in Ghana. Ballots were printed in color in the United States. After study background and instructions from a moderator, participants began the questionnaire by writing in their favorite food or beverage, and indicating words, followed by emojis indicating how the favorite item makes them feel. Then, participants completed the same questions for a disliked food or beverage. Next, the 8 food images used in study 1 were shown in a balanced, randomized design. The printed version was designed so that when the stapled ballot was opened, only one sample image would be visible at a time. The same 5 questions used in study 1 were asked for each sample (sample familiarity, image liking, emotion word CATA, and emoji CATA). After each sample, instructional text named the subsequent stimulus to allow participants to mentally transition before turning the page.

After fielding the study, researchers entered the paper ballot responses into an online version of the questionnaire so that the resulting data file would be formatted similarly to the outputs from studies 1 and 2. Due to excessive incomplete data, two ballots from study 3 were not included in the final data set.

Statistical Analysis

All statistical analyses were performed in XLSTAT 2016 (Addinsoft, Paris, France). Results from the three studies were compiled into a combined data set. Frequencies of emotion word and emoji selection were tabulated for the child's favorite and disliked foods for all 329 participants. Due to missing responses for image liking on some ballots, 6 participants were removed from the data set prior to conducting correspondence analysis and cluster analysis. Correspondence Analysis with Hellinger distance was conducted on the overall data set from 323 respondents. Cochran's Q test was performed and values that were not significant at $\alpha < 0.10$ were removed from the analysis. Cluster analysis using k-means with the Trace (W) criterion was conducted on the centered and reduced liking scores of the eight products to identify participant clusters. Analysis of Variance (ANOVA) with Tukey's honest significant differences (HSD) means separation was conducted on the liking responses for each cluster. Next, Correspondence Analysis with Hellinger distance was conducted on attributes significant at $\alpha < 0.10$ for each consumer cluster. Finally, penalty analysis was applied to the CATA data and likings responses using the CATA data analysis function in XLSTAT 2016. The analysis in CATA penalty analysis in XLSTAT 2016 follows the approach by Ares *et al.*(2014), where researchers suggested using comparing consumer's sample responses to consumer's responses to an ideal product. For this research, children's emotion responses to their favorite food or beverage were set as the ideal, and penalties are determined based on changes in selection from the favorite item.

Results and Discussion

Word and Emoji Selections for Favorite and Disliked Foods

Frequencies of emotion word and emoji selection for favorite and disliked foods or beverages are plotted in Figure 7.1. Emotion word and emoji valence categorizations (positive, negative, neutral) are based on perceptions of children, which are discussed further in Chapter 4.

a)

b)
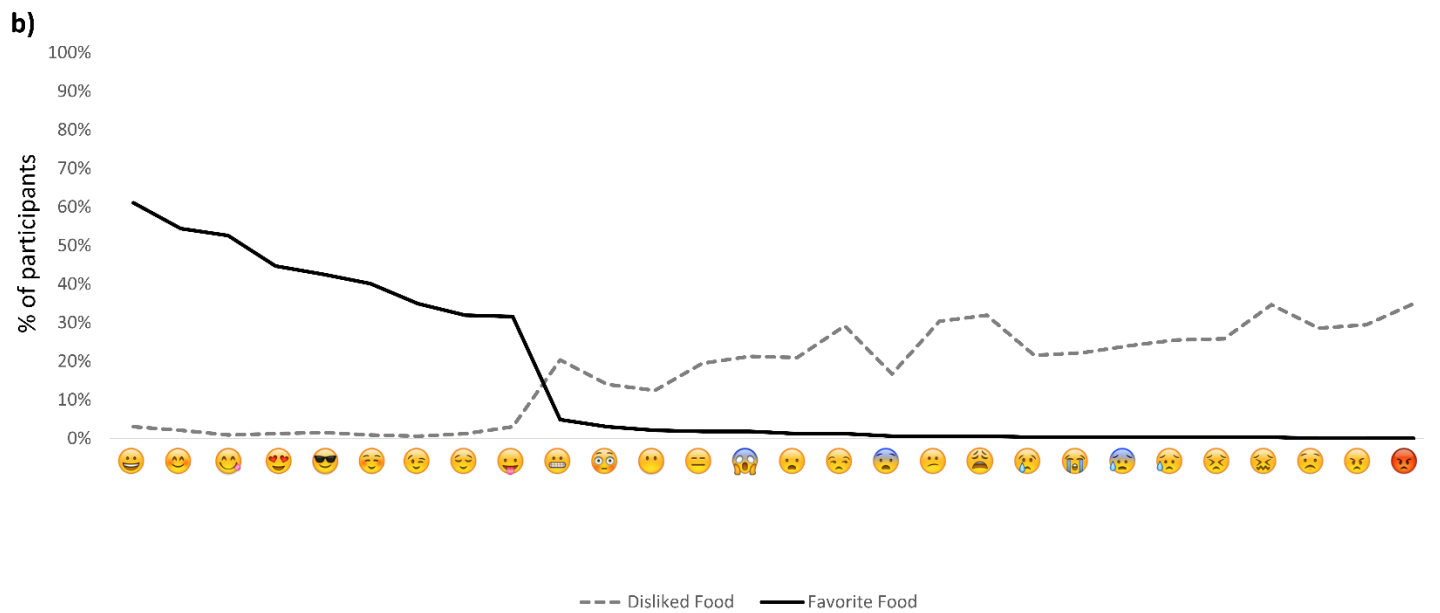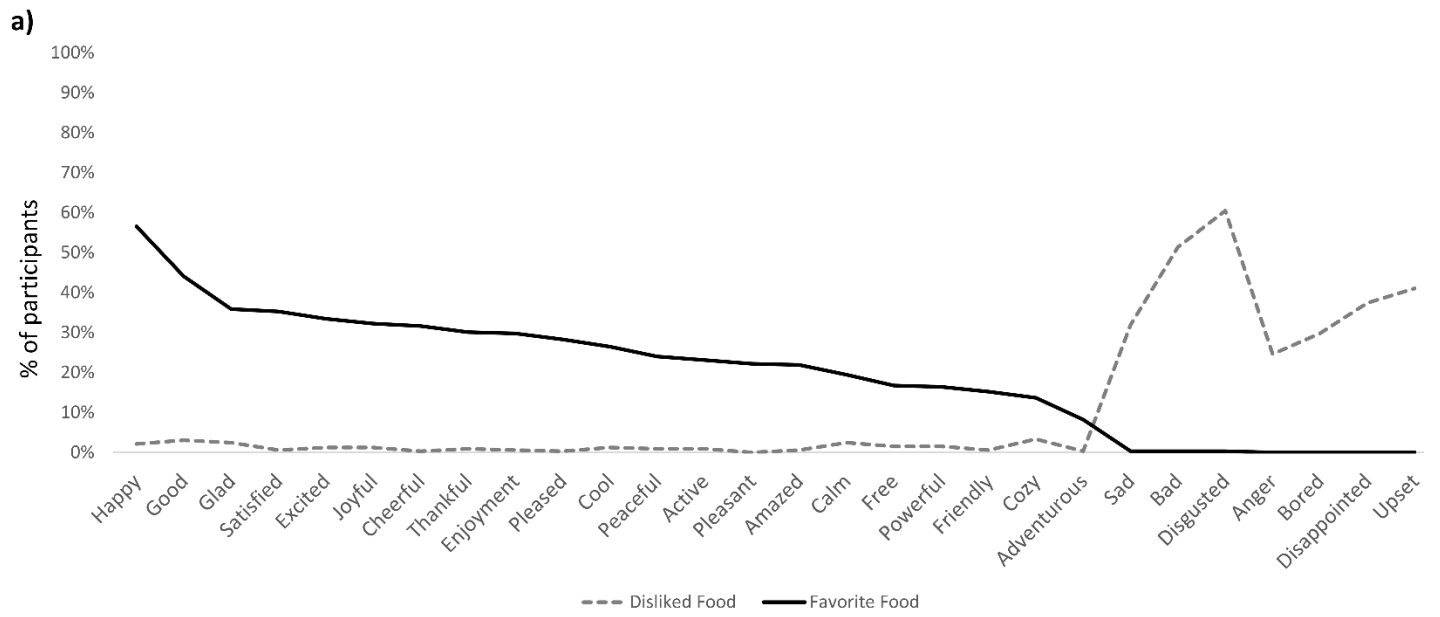
FIGURE 7.1 FREQUENCY (%) OF RESPONSES FOR FAVORITE AND DISLIKED FOODS USING (A) EMOTION WORDS AND (B) EMOJIS

Participants across all three studies used positive words and emojis (e.g. happy, good, Grinning Face, Smiling Face with Smiling Eyes) to describe how their favorite food or beverage makes them feel. Negative words and emojis (e.g. disgusted, bad, Confounded Face, Pouting Face) were used by participants to explain how a self-selected disliked food makes them feel. The emotion set used in these studies, identified through research detailed in Chapters 3 and 4, skews more positive for emotion terms, but more negative for emojis. The positive skew of emotion words is supported by previous research, which shows a greater likelihood of consumers reporting positive emotions, referred to as hedonic asymmetry (Schifferstein and Desmet 2010).

Cluster Analysis

The cluster analysis yielded 4 clusters of children across the three studies. Mean product liking scores for each cluster are summarized in Table 7.2. Children in Cluster 1 (n=86) strongly disliked fresh spinach, while mean scores for other products fell at "just a little good" or higher on the super good-super bad scale. The 68 children in Cluster 2 liked white grapes and orange juice, but did not like the cheddar cheese cubes. Cluster 3 (n=112) liked all products, with the lowest mean liking score falling just above "good" on the liking scale. Cluster 4, which had 57 respondents, did not like the vegetable samples (baby carrots and fresh spinach).

TABLE 7.2 MEAN LIKING SCORES FOR EACH CONSUMER CLUSTER AND /

Cluster	Baby Carrots	Cheddar Cheese	Chocolate Grahams	Fresh Spinach	Lychee Gummy	Orange Juice	White Bread	White Grapes	*p-value*
CL1 (n=86)	7.3[a]	7.6[a]	7.8[a]	3.1[c]	6.0[b]	7.9[a]	7.6[a]	7.3[a]	*<0.0001*
CL2 (n=68)	6.5[bc]	4.0[f]	5.8[cde]	5.4[de]	5.0[ef]	6.8[ab]	6.3[bcd]	7.6[a]	*<0.0001*
CL3 (n=112)	7.5[abcd]	7.4[bcd]	7.8[ab]	7.1[d]	7.2[cd]	8.0[a]	7.7[abc]	7.8[ab]	*<0.0001*
CL4 (n=57)	3.3[c]	6.0[b]	7.2[a]	3.9[c]	5.9[b]	7.2[a]	6.8[ab]	5.9[b]	*<0.0001*

Means within each cluster with the same superscript are not significantly different at p < 0.05 according to pairwise comparisons with Tukey's HSD.

Error! Not a valid bookmark self-reference. contains details about the demographics of the four clusters. Cluster 2 had more participants from the image studies and fewer appearance study participants when compared to other clusters. Cluster 4 had more males than females, while Cluster 1 had more females than males. Cluster 3 had the highest percentage of study 2 participants.

TABLE 7.3 CONSUMER CLUSTER DEMOGRAPHICS

Demographics**		Cluster 1 (n=86)	Cluster 2 (n=68)	Cluster 3 (n=112)	Cluster 4 (n=57)
Study					
Study 1: U.S. Image		34%	38%	25%	30%
Study 2: U.S. Appearance		37%	19%	41%	35%
Study 3: Ghana Image		29%	43%	34%	35%
Age					
Studies 1 & 2	7 years	13%	7%	15%	11%
	8 years	16%	12%	13%	16%
	9 years	12%	13%	13%	12%
	10 years	13%	12%	11%	12%
	11 years	17%	13%	15%	14%
Study 3	12 years	29%	43%	34%	35%
Gender					
Boy		41%	46%	49%	60%
Girl		56%	54%	48%	39%

***Percent values indicate the percent of cluster members within a demographic group.*

Correspondence Analysis

The correspondence analysis for the full data set is shown in Figure 7.2. The first two dimensions account for 90.72% of variability in the data. The first dimension, accounting for 85.77% of variability in the data, distinguishes between positive and negative emotion responses, while the second dimension separates low and high-arousal emotions. The favorite food emotion experience was characterized by the terms enjoyment, thankful, and powerful, and the emojis Grinning Face, Smiling Face with Smiling Eyes, Face Savouring Delicious Food, and Winking

Face. Emotion responses to avoid include disappointed, upset, Worried Face, and Confused

Face.
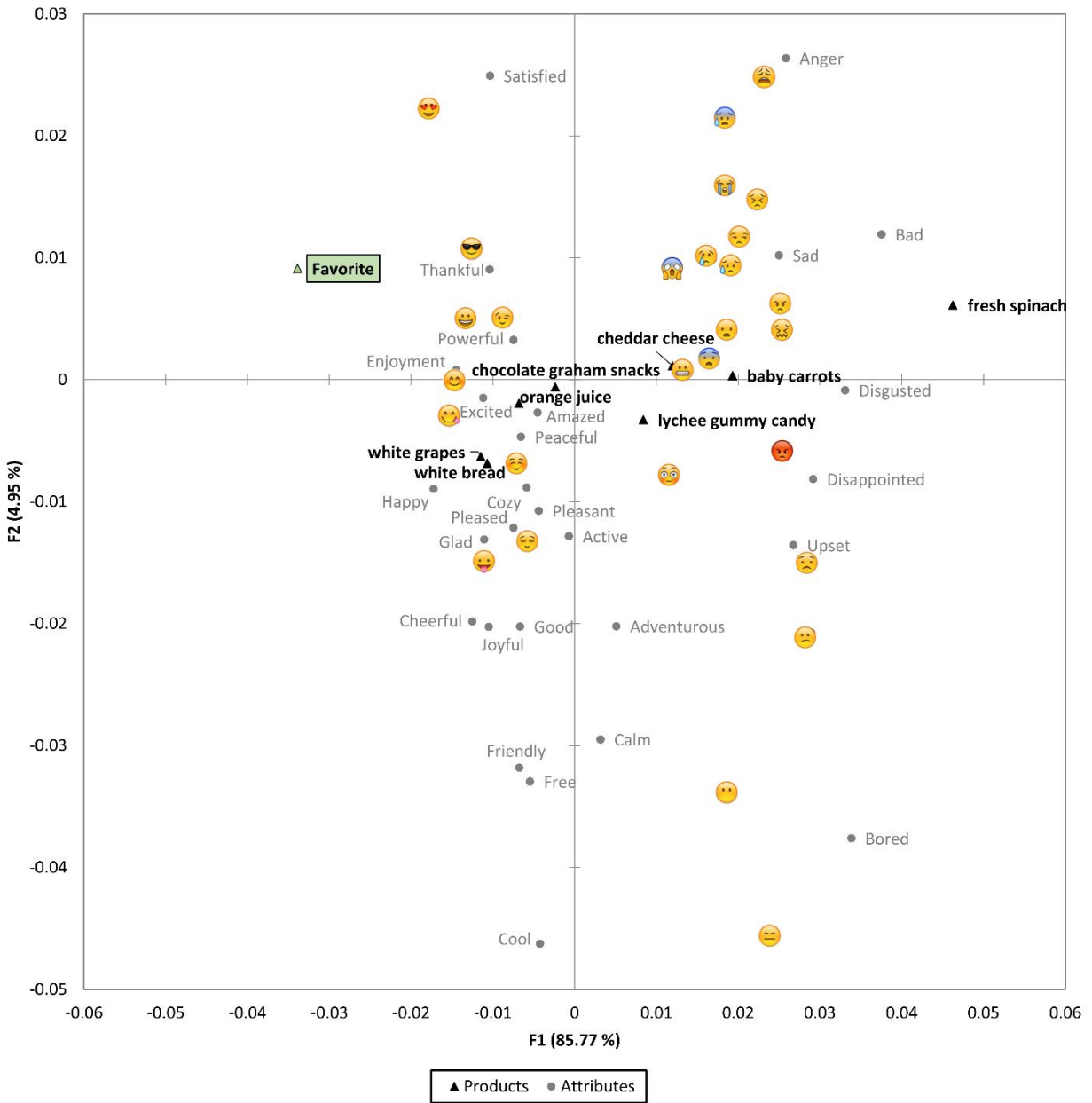
FIGURE 7.2 CORRESPONDECE ANALYSIS MAP FOR ALL RESPONDENTS (N=326)

 Correspondence Analysis by Cluster

Cluster 1

The Correspondence Analysis map for Cluster 1, which disliked fresh spinach and skewed female, is shown in Figure 7.3. The favorite food or beverage makes these children feel satisfied and thankful. Emojis that align with a favorite food experience include Face with Stuck-Out Tongue and Smiling Face with Sunglasses. Negative food experiences, such as the disliked spinach sample, are described by terms such as anger and upset, and emojis including Disappointed but Relieved Face and Worried Face.
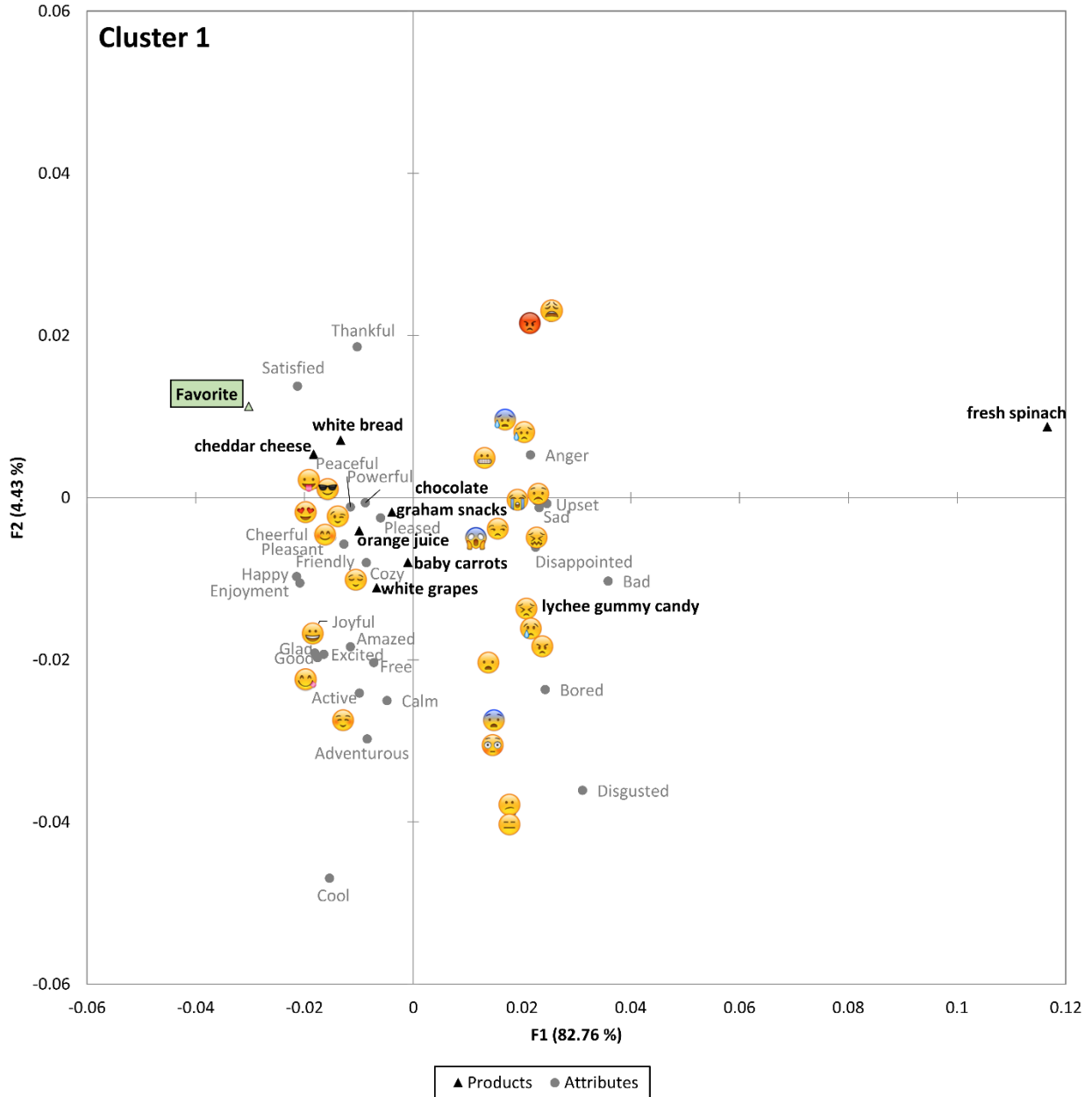
FIGURE 7.3 CORRESPONDENCE ANALYSIS MAP FOR CLUSTER 1 (N=86)

Cluster 2

Cluster 2 consisted of more image study (studies 1 & 3) participants and disliked cheddar cheese cubes (Figure 7.4). The recalled favorite food experience elicited emotions related to satisfied, Smiling Face with Heart-Shaped Eyes, happy, pleased, and cheerful. The disliked cheddar cheese elicited responses including disappointed, Fearful Face, Pouting Face, and disgusted. White grapes were the most liked sample for this cluster. For these participants, white grapes were associated with Face with Stuck-Out Tongue, joyful, and Smiling Face with Smiling Eyes.
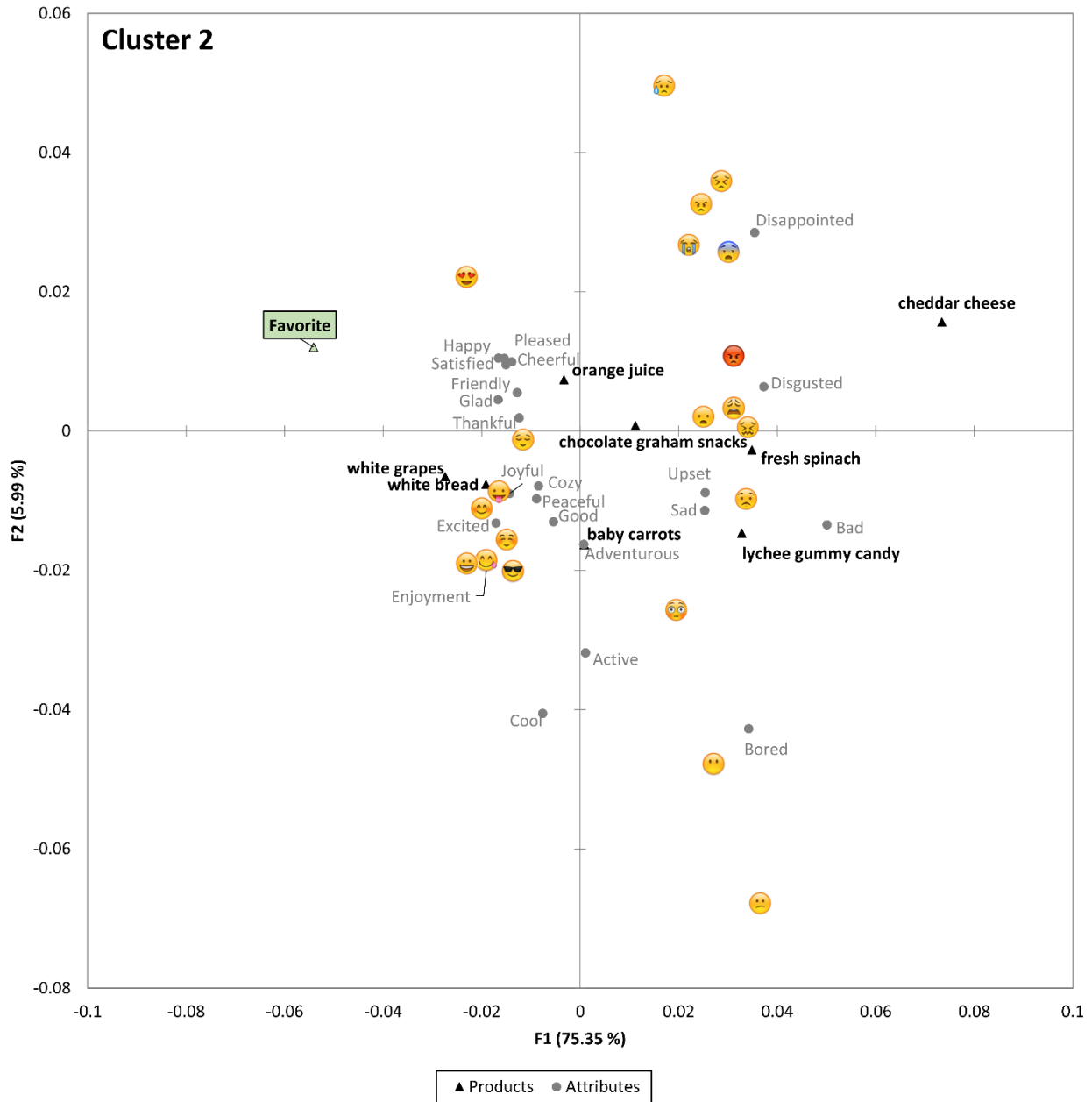
FIGURE 7.4 CORRESPONDENCE ANALYSIS MAP FOR CLUSTER 2 (N=68)

Cluster 3

The Correspondence Analysis map for Cluster 3 is shown in Figure 7.5. Cluster 3 had more appearance study (study 2) participants and generally liked all samples. For this cluster, the favorite food or beverage elicited emotions related to the emojis Smiling Face with Smiling Eyes and Face with Stuck-Out Tongue. Emotion words that described the emotion response to the favorite food included cheerful and happy. Orange juice had the highest liking score for Cluster 3, which made these participants feel active and amazed.
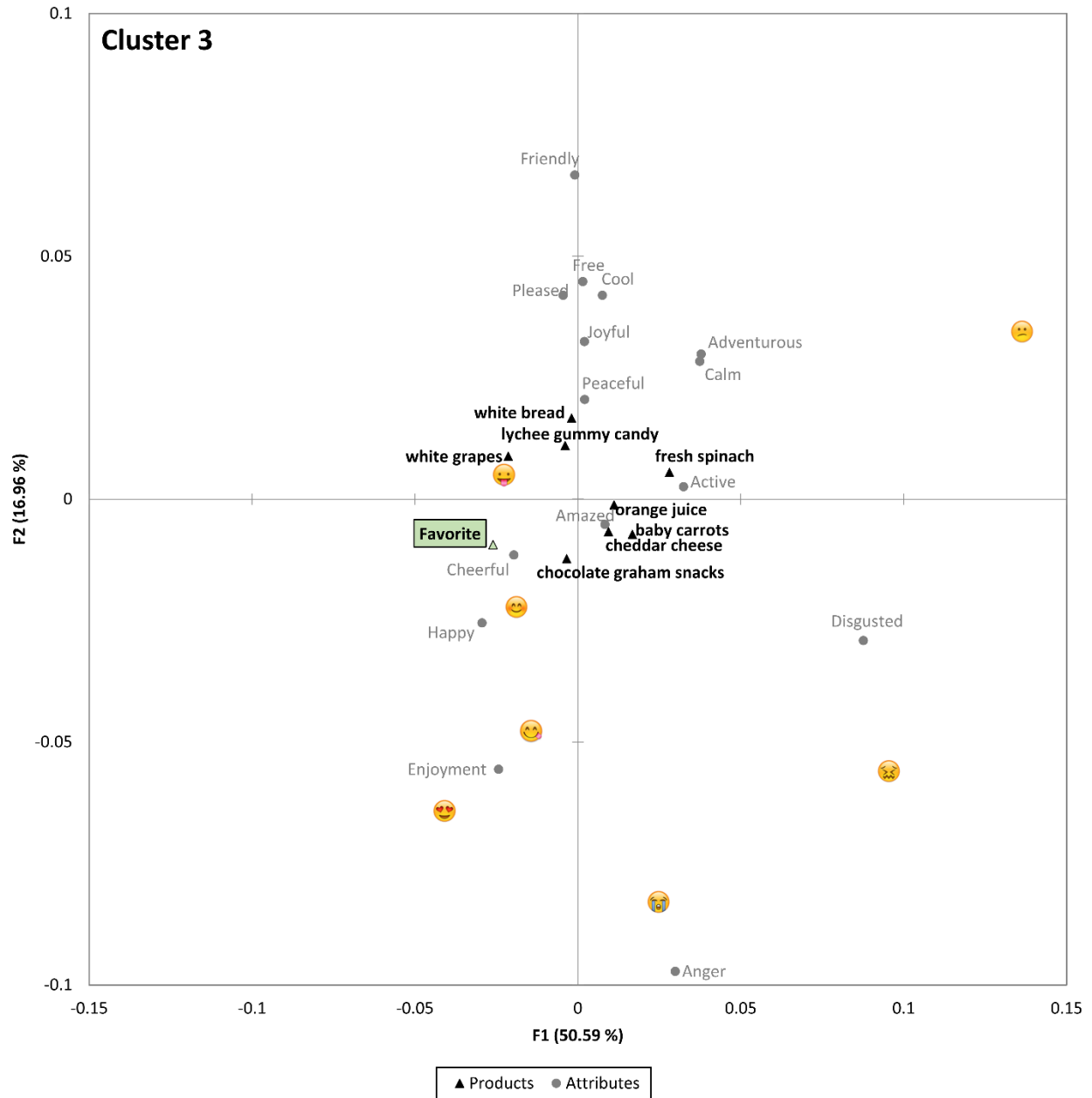
FIGURE 7.5 CORRESPONDENCE ANALYSIS MAP FOR CLUSTER 3 (N=112)

Cluster 4

Figure 7.6 shows the Correspondence Analysis map for Cluster 4, which had more males than females. The favorite food experience was driven by Smiling Face with Sunglasses, Face Savouring Delicious Food, satisfied, thankful, and Smiling Face with Smiling Eyes. Both baby carrots and fresh spinach were disliked by respondents in Cluster 4. These vegetable samples were related to negative emotion words and emojis, including sad, angry face, persevering face, bad, and anger. For this cluster, orange juice and chocolate graham snacks were the samples with the highest mean liking scores. These samples were associated with enjoyment, Smiling Face with Heart-Shaped Eyes, Grinning Face, happy, Smiling Face, joyful, and glad.
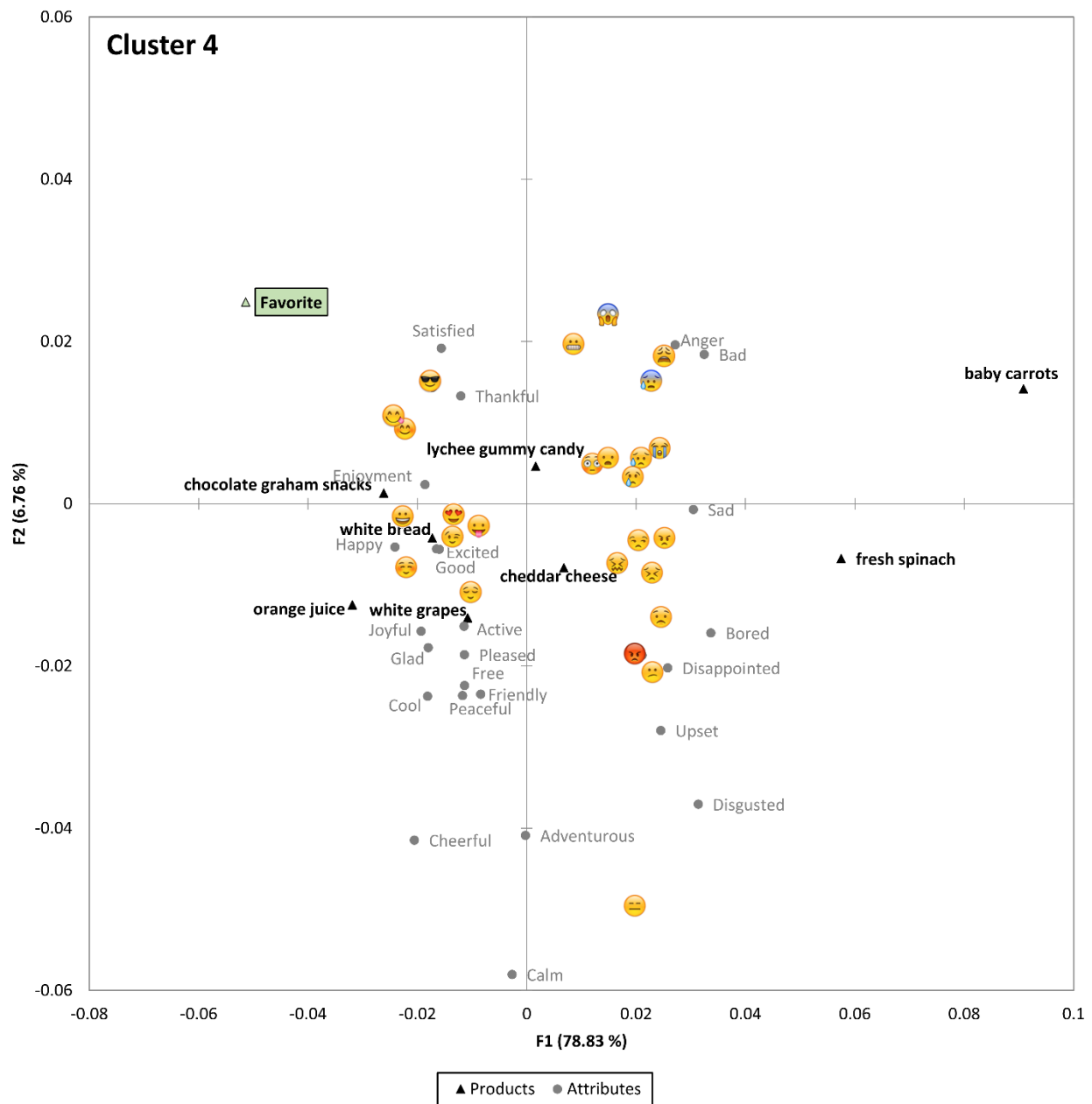
FIGURE 7.6 CORRESPONDENCE ANALYSIS MAP FOR CLUSTER 4 (N=57)

CATA Penalty Analysis

Mean impact results from penalty analysis of cluster CATA responses are provided in Figure 7.7. All emojis and emotion words included in this figure deviated from the ideal response for a minimum of 20% of children in the cluster. The penalty analysis identifies four categories of responses: "must have" (item is checked for the ideal and preference for products that are checked is higher than products when it is not checked), "nice to have" (item is not checked for ideal, but preference for products that are checked is higher than products when it is not checked), "must not have" (item is not checked for the ideal and preference for products that are not checked is higher than products when it is checked), and "does not harm" (the item is not checked for the ideal product and preference for products that are unchecked is similar to preference for products that are checked).

Happy, Face Savouring Delicious Food, and Smiling Face with Smiling Eyes each had a significant impact for all four clusters. For Cluster 1, emotion responses happy, Grinning Face, Smiling Face with Smiling Eyes, Smiling Face with Heart-Shaped Eyes, Face Savouring Delicious Food, and Smiling Face with Sunglasses were "must haves". "Does not harm" emotions for Cluster 1 were calm, pleasant, and Flushed Face. For Cluster 2, happy, Grinning Face, and Smiling Face with Smiling Eyes were "must haves", while cozy, peaceful, satisfied, and Flushed Face were categorized as "does not harm". "Must have" responses for Cluster 3 were happy, Smiling Face with Smiling Eyes, Smiling Face with Heart-Shaped Eyes, and Face Savouring Delicious Food. Emotion responses that do not harm the outcome for Cluster 3 were active, adventurous, amazed, calm, cheerful, cool, enjoyment, free, friendly, joyful, peaceful, pleased, and Face with Stuck-Out Tongue. For Cluster 4, Grinning Face was a "must have", and the selection of Expressionless Face "does not influence" the outcome. Positive words and

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emojis were important for all 4 clusters. De Pelsmaeker and colleagues (2013) observed an

association between positive emotion selections in a CATA format and higher brand preference.
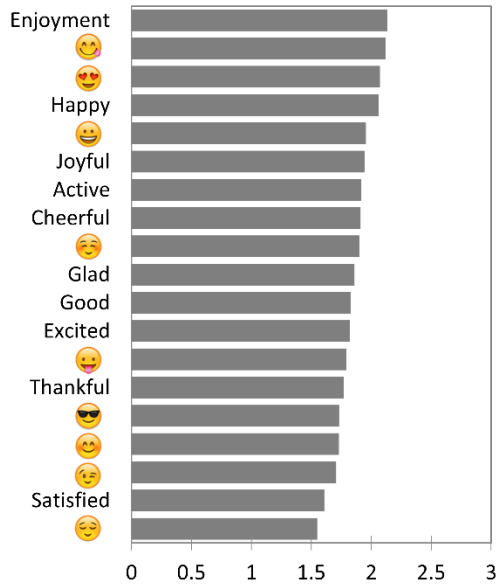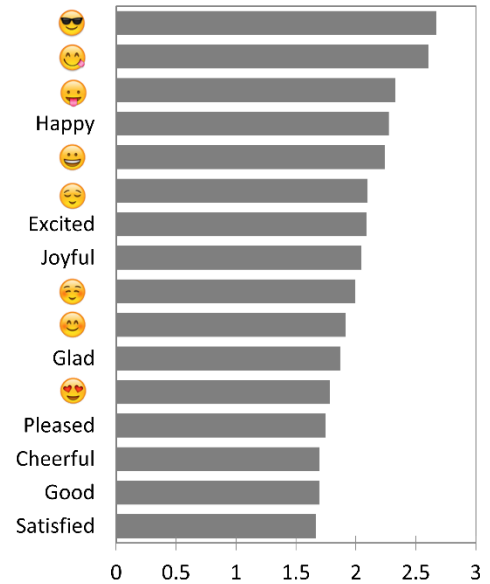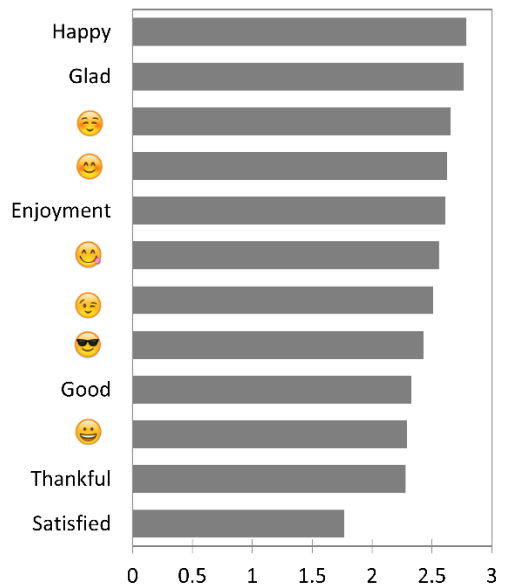
FIGURE 7.7 MEAN IMPACT RESULTS FOR EACH CONSUMER CLUSTER

In this CATA penalty analysis, liking scores for the ideal or favorite product are assumed to be a 9, since liking responses were not collected for the favorite or disliked foods. Meyners and Castura (2016) caution that this assumption may not hold for all consumers, and thus it is best to collect liking responses when including an ideal product assessment whenever possible.

Conclusions

As has been previously observed in research with adult consumers, favorite foods were associated with positive emotion selections, while disliked items elicited negative emotion selections. Positive emotions influenced liking for all four clusters, although specific emotion words and emojis most associated with children's favorite foods varied by cluster. The identity of consumer clusters varied by gender and study type, as the cluster with the highest percentage of participants from the Ghana image study also had the highest percentage of participants from the U.S. Image study. This aligns with findings from previous research with children, which illustrated differences in emotion word and emoji selection dependent on the format of the stimuli (see Chapter 6 for further information).

Key "must have" emotion responses from children across the clusters were happy, Face Savouring Delicious Food, and Smiling Face with Smiling Eyes. The penalty analysis did not reveal emotion words or emojis that were "must not haves". This is likely due to children's overall low usage of negative words and emojis in their assessments of foods. This research suggests that sensory scientists targeting a "favorite food" experience with children should pay close attention to the frequency of use of positive emotion words and emojis as an indicator of a favorite food experience.

While the present research provides insights into emotion words and emojis related to children's favorite food experiences, there are some limitations to be considered. First, this

research details the findings comparing children's evaluations of food appearance of actual foods or images. For a better understanding of cross-cultural emotion responses, testing with actual foods including a taste assessment is recommended. Another limitation of this research is the structure of the questionnaires. In all three studies, emotion word responses were always collected before the emoji assessment, which may have introduced a bias in the outcome. Additionally, emotion words were always presented alphabetically due to the amount of words provided (28), while emojis were presented randomly across assessors, with each participants seeing the same emoji order for all questions on the ballot. Further testing is necessary to understand the best practices for questionnaire structure when using emotion words and emojis with child participants. This study considered a wide range of products as an initial test of the tool, but further investigation is suggested within product categories to identify key emotions to target or avoid when designing foods and beverages for children.

Further investigation with other cultures is recommended to expand upon these findings. The children in all three studies share English as a common language, although regional dialects are also spoken in Ghana. More work is needed to understand children's emoji usage across a broader range of cultures. The emotion words and emojis used in the present research are intended for use with a broad range of products, so there remains opportunity to narrow the emotion list for evaluation within a product category. A reduced list of emojis and emotion words would simplify the questionnaire so that the reduced list can be assessed with rating scales, rather than a CATA approach, which may help to further differentiate products.

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Chapter 8 - Conclusions

The goal of this research was to gain insight into American and Ghanaian children's usage of emotions, both through emotion words and emojis, in response to food and beverage stimuli. Overall, children were able to complete a check-all-that-apply task to assess emotions for a variety of foods and expressed a positive attitude towards the testing method. Further research is necessary to identify best practices for emotion assessment with children.

In U.S. focus groups, children were receptive to using both words and emojis to express their emotions in response to food or beverage stimuli. Participants were able to use the words and emojis to describe both recalled and actual food experiences. Additionally, children were able to explain the different emotions throughout the consumption experience (e.g. joyful before consuming a liked food and sad when the liked food is gone).

Children in Kansas and Accra, Ghana indicated valence categorizations (positive, negative, neutral) for words and emojis in the two food image studies. Directional valence was similar when compared across the two cultures, but there were some finer differences in valence categorization between the two groups of participants. For example, the term "adventurous" was categorized as positive by a greater percentage of American children, while "calm" was categorized as positive by a greater percentage of Ghanaian children. Additionally, "cozy", a term characterized as either positive or neutral by the majority of U.S. respondents, did not have a conclusive valence categorization in the Ghana study. Although few major differences were noted in valence categorization between the populations, these differences may have a greater impact on data resulting from the assessment of more similar products.

Children's responses to food image, food appearance, and food taste were compared to understand the impact of stimulus type on children's emotion responses. Responses from the

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emoji question were most impacted by assessment type, with fewer significant differences in emoji selection in the image condition as compared to the appearance and taste assessments. Children's liking scores were also lower in response to the assessment of a food image versus the emotion response to a tasted food. Both word and emoji usage were low overall in the image condition for the lychee gummy candy, which was unfamiliar to most participants. On the other hand, emotion responses to orange juice, which almost all study participants had tried before, were more stable across assessment types, although some differences were observed. In selecting food stimuli for testing with children, researchers should consider children's familiarity with the product. For best results, testing with a taste assessment is recommended for emotion research with children.

When thinking about emotions experienced in response to a favorite food or beverage, children selected positive words and positive emojis. For disliked foods, negative words and emojis were selected. For a favorite food experience, "happy", Smiling Face with Smiling Eyes, and Face Savouring Delicious Food were "must haves". These "must have" emotions were determined through comparison of the sample response to the favorite food response, and therefore may change dependent on the product category. Further testing is necessary to identify words and emojis to have or avoid for more sample sets within a product category.

In conducting cross-cultural research with children, several factors were important to consider when adapting study plans to a foreign environment. Changes were made to study procedures prior to arrival in Ghana, while fielding in Ghana, and upon returning to the United States. Key factors to consider included the sample format (image vs. actual foods), recruiting procedures, data collection methods, participant compensation, study timing, and number of participants. In order to conduct cross-cultural consumer testing with children, collaboration and

adaptability are critical. An on-site collaborator can help shape study protocols, weigh in on cultural matters, and lay the groundwork prior to the arrival of the external researcher. Even with careful planning, problems may arise, and the researcher must remain adaptable.

The research within this dissertation represents provides an initial investigation into children's usage of emotion words and emojis for emotion assessment of foods. Several opportunities exist for future research. One opportunity is in category-specific research. Testing with more closely-related products can help researchers narrow the set of words and emojis further to those that are important to the specific product category, which may allow for use of a rating scale rather than a check-all-that-apply (CATA) question format. Rating allows for further differentiation of emotion responses, potentially helping to further differentiate products. Additionally, it is important to understand whether or not emotion responses from children are significantly different for more similar products, and if so, whether these emotion responses provide information beyond what is obtained through liking questions. Another research opportunity is the possibility for further cross-cultural research with emojis. The present research only considered English-speaking cultures, so future research may consider non-English speaking cultures. This is especially important for further understanding of emojis as an emotion assessment tool for children, which have the potential to serve as a stand-alone tool without the need for translation of emotion words. While this research only considered emojis from Apple, several emoji sets are available. Of particular interest is EmojiOne, which is an open source emoji set, eliminating the need for copyright permissions for publication of scholarly articles. Future work should investigate whether different emoji sets produce the same results and the nature of any observed differences between emoji sets.

Appendix A - Permission to Use Apple® iOS 8.3 Emojis from Apple Inc.

From: Permissions <Permissions@apple.com>
Date: June 23, 2016 at 2:30:05 AM GMT+1
To: Edgar Chambers IV <eciv@ksu.edu>
Subject: Re: Emojis in research study / RP015205

Hi Edgar,

Thank you for your clarifying email. Apple hereby agrees with the additional stipulations. Please note however that in the event the proposed use of the Apple emojis deviates from the original request, additional permissions will be required.

Best regards,

Rights & Permissions Team
permissions@apple.com
Apple Inc.

Ref:ks

This transmission may be privileged and may contain confidential information intended only for the person(s) named above. Any other distribution, re-transmission, copying or disclosure is strictly prohibited. If you have received this transmission in error, please notify us immediately by return e-mail, and delete this file/message from your system.

On Jun 10, 2016, at 11:16 AM, Edgar Chambers IV <eciv@ksu.edu> wrote:

We can agree to this with the following stipulations that do not seem entirely clear in your e-mail
1) This is a team project carried on by Dr. Edgar Chambers IV, Dr. Delores Chambers, Dr. Marianne Swaney-Steuve, and Ms. Katharine Gallo for her doctoral research. In some cases there may be other collaborators on the research, for example when we test in alternative locations than our own laboratories. However, in those cases the emojis will not be out of the control of Ms. Gallo, but others may be part of the research project.
2) Because this is an academic research project we must be able to publish the emojis as we refer to them in the research, with proper citation including Apple's copyright of course. By doing that we will by necessity have to give permission to both the dissertation publisher and journal publishers to publish the emojis from our printed versions from the Apple devices. We will have to show that we have permission from you to do that.
3) We will be finished with the research with 1 year, but it may take longer for the publications to be reviewed and actually published. We have no control over the actual publication process. Thus, we must have permission to continue with the publication of the research after the 1 year period.

Thank you for your consideration of these stipulations.

Edgar Chambers IV
Director and University Distinguished Professor

Sent from my iPad

On Jun 10, 2016, at 6:07 PM, Permissions <permissions@apple.com> wrote:

Hi Edgar:

Thank you for your interest in using Apple's **emoji designs. This confirms that Apple authorizes you to reproduce and/or display Apple emoji designs subject to the following terms and conditions:**

- **You are permitted to reproduce and/or display the specific Apple emoji designs identified in your request but only for the specific purpose identified in your request. You understand that this permission does not allow you to alter, modify or manipulate the Apple emoji designs in any way.**

- You agree to reproduce the Apple emojis using the embedded software on your Apple device (in other words, you agree not to copy Apple emoji designs appearing on the web or from third party sources which designs may not accurately reflect the actual designs and dimensions of Apple emojis).
- You agree that the permission is one-time only and applies only to the specific purpose identified in your request.
- You acknowledge that Apple may terminate this permission at any time and for any reason.
- You agree that this permission shall automatically terminate one year from now.
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- You hereby release Apple from any claims arising from your reproduction and display of Apple emoji designs and acknowledge that Apple makes no representations or warranties of any kind concerning its Apple emoji designs.

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Best regards,

Rights & Permissions Team
permissions@apple.com
Apple Inc.

Ref:ks

Customer Name: Edgar Chambers
Customer Email: Eciv@ksu.edu
company name copyright: Kansas State University - Sensory Analysis Center
describe copyright: We are conducting research with children looking at how the evaluate products (we are using food in these early stages)?using both words and emojis. We are planning to use Apple emojis because we are using IPads for data collection and realized we may need permission to use these emojis. We will be comparing the emojis to the words/scores they give the products and will also have them match words and positive/negative feelings to the emojis. This would be published. Can we get permission to use the emojis for this research and testing and to publish them in relation to the research? If we do not need permission we need to know that as well in order to satisfy journal requests for publication. Thank you for your time.
telephone copyright: 785-341-4443
title copyright: University Distinguished Professor - Director

Appendix B - Focus Group Moderator Guide (Chapter 1 - Chapter 2)

Hello everyone! My name is _____ and I will be moderating today's session. For the next hour, we will be talking about food.

You will have several activities during today's session: joining in group discussion, doing some writing on your own, and looking at some menus. Please be very open with your comments – there are no wrong answers. I want to hear from each of you.

I work for the Sensory and Consumer Research Center here at K-State Olathe and I am working on this project to help learn what kids think about different foods.

I would like to thank you all for coming today and taking the time to be here.

Items to mention (not verbatim):

A. *Disclosures*
   a. *Facility Setting*: Microphones, video camera taping, observers in back room
   b. We're taping this session so I can remember <u>what was said</u>, but I'm <u>not concerned with who said what</u>.
B. *Guidelines*
   a. Please talk one at a time
   b. Speak as loud as I am speaking
   c. No side conversations
   d. I want to hear from all of you, but you don't have to answer every question
   e. It is okay to add on to someone else's comments, but be sure to speak one at a time and do not interrupt others
   f. Try to talk as much as everyone else so that no one talks to little or too much. I may call on some kids and not others to make sure that everyone gets a chance to speak.
   g. It is okay to disagree. Remember, there are no wrong answers!
   h. Say what you believe, whether or not anyone else in the room agrees with you

INTRODUCTION

I would like to start by having everyone introduce themselves. Please tell us your name and what you ate for breakfast/lunch (*adjust depending on time of day*).

Describing Foods

For homework, I asked you to describe your favorite food and your least favorite food. Let's start with your favorite foods.

Take notes and leave them up for later use

Favorite Food (moderator: focus on how it makes them feel, attitudes, etc.)

1. What do you like about your favorite food? *Probe: Tell me about what makes it good.*

2. How would you describe your favorite food?

3. How does this food make you feel? *Probe: how do you feel when you eat this food? How do you feel after you eat this food?*

4. In front of each of you there is a sheet with some faces on it. Which of the faces match how your favorite food makes you feel when you eat it?

5. What makes this food better than other foods?

Least Favorite Food (moderator: focus on how it makes them feel, attitudes, etc.)

Now, let's think about your least favorite food.

1. What do you dislike about your least favorite food? *Probe: What about it is not good – taste/looks/smell?*

2. How would you describe your least favorite food? How would you describe it to a friend?

3. How does your least favorite food make you feel – when you are having to eat it/smell it/see it?

4. Which of the faces match how your least favorite food makes you feel? *Probe: What about that face matches how you feel? Which words would you use to describe how that face feels?*

5. What makes this food worse than other foods? *Probe: How is the taste/how it looks/smells worse than other foods? How does it make you feel compared to other foods?*

Food Intervention

Moderator presents participants with 3 products closed in packaging: Ramune soda, Lunchables, and plain oatmeal. Servers enter with individually portioned samples of each item for participants. Moderator will have packages of each item stored out of sight until after children have provided initial and post-consumption feedback)

I have some foods I'd like you to tell me about. Please wait to try the foods until I tell you to do so. Let's start with the Ramune soda.

(*Ask questions for initial impressions, after eating, and after package presentation*)

1. How would you describe this food? How would you explain it to the person who drive you here during the car ride home?

2. What do you like about this food? What is good about it?

3. What do you dislike about this food? What is bad?

4. How does this food make you feel? (***moderator: record terms on board***)

5. Which of the faces match how this food makes you feel?

Repeat with Lunchables and oatmeal.

Activity: Discussing food terms

Prior to the session, moderator has prepared a poster board or other display board with 3 divided sections labelled "positive", "negative", or "neutral". Children will place post-it notes into the appropriate section.

I want to know more about the words that you use to describe foods and how foods make you feel. Take the next 5 minutes to think about how foods make you feel, and whether or not those words are positive, negative, or neutral. It can be any food you can think of, not just the ones we tried today. You can use the words on the board, the words or faces on stickers in front of you, or your own words that you think of. Put each word or face on its own sticky note. When you're ready, put the sticky note on the board in the positive, negative, or neutral category where you think it belongs.

Moderator will observe word placement, look for inconsistencies among group members

1. *For positive words:* Describe a situation where _____ is a good word.

2. *For negative words*: Describe a situation where _____ is a bad word.

3. *For neutral words*: Are there any times you would use _____ as a good word? A bad word?

4. *For inconsistent words*: I see some of you said that _____ was positive, while others put it in the negative box.
   a. For those of you who put it in the positive box, how tell me about how you would use this word in a positive way.

   b. For those of you who put it in the negative box, how tell me about how you would use this word in a negative way.

5. *For faces*: (***moderator: in addition to types of questions asked for words***) What words would you use to describe the feeling that this face shows?

Describing the lunch menu

Now let's take a look at the lunch menus you read for homework.

1. What about (*day of the week*) made it a day that you would/would not want to eat lunch?

2. How would you describe the foods on these lunch menus?

   a. Are there any words that we've talked about that you would use to describe these foods

3. Describe for me how this food is _____.

4. How do you think you would feel <u>after</u> eating this food?

5. Are there any other words you would use to describe these foods?

      a. *New terms*: Would you put this word in the positive, negative, or neutral box?

6. Which of the faces would you use to describe this food?

Closing

Is there anything else you would like to say about the foods we talked about today?

Before we leave, I'd like to summarize what we talked about today.

Main points:

As we wrap up, I would like to thank you so much for all of your input. Your opinions have been very helpful and I have learned some new things from you today.

    Thank you all very much!

Appendix C - U.S. Image Study Questionnaire (Chapters 4, 5, 6, & 7)

Study Introduction

Favorite and Disliked Foods (Open-End)

Favorite Food – Emotion Words

${WILDCARD1} pipes in the child's response to the favorite food open-end question.

Favorite Food - Emojis

Here are some faces that may tell how a food makes you feel.
Look at the faces and click on the faces that match how the food makes you feel.

How does ${WILDCARD1} make you feel? (Choose as many faces as you need)

None of these faces

Next

${WILDCARD1} pipes in the child's response to the favorite food open-end question.

"???" does not display on the questionnaire when running and indicates that the order of the emojis is randomized

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Disliked Food – Emotion Words

Here are some words that may tell how a food makes you feel.
Read the words and click on the words that match how the food makes you feel.

How does ${WILDCARD1} make you feel? (Choose as many words as you need)

☐ Active	☐ Adventurous	☐ Amazed	☐ Anger
☐ Bad	☐ Bored	☐ Calm	☐ Cheerful
☐ Confused	☐ Cool	☐ Cozy	☐ Daring
☐ Desire	☐ Disappointed	☐ Disgusted	☐ Dissatisfied
☐ Eager	☐ Energetic	☐ Enjoyment	☐ Excited
☐ Fear	☐ Free	☐ Friendly	☐ Glad
☐ Good	☐ Happy	☐ Hope	☐ Interested
☐ Joyful	☐ Loving	☐ Mild	☐ Nervous
☐ Peaceful	☐ Pleasant	☐ Pleased	☐ Powerful
☐ Pride	☐ Quiet	☐ Relief	☐ Sad
☐ Safe	☐ Silly	☐ Satisfied	☐ Surprised
☐ Thankful	☐ Tired	☐ Ugly	☐ Upset
☐ Weird	☐ Wild	☐ Worried	☐ None of these feelings

Next

${WILDCARD1} pipes in the child's response to the disliked food open-end question.

176

Disliked Food - Emojis

Here are some faces that may tell how a food makes you feel.
Look at the faces and click on the faces that match how the food makes you feel.

How does ${WILDCARD1} make you feel? (Choose as many faces as you need)

${WILDCARD1} pipes in the child's response to the disliked food open-end question.

"???" does not display on the questionnaire when running and indicates that the order of the emojis is randomized

177

Current Emotion – Emotion Words

Here are some words that may tell how you feel.
Read the words and click on the words that match how you feel.

How do you feel right now? (Choose as many words as you need)

☐ Active	☐ Adventurous	☐ Amazed	☐ Anger
☐ Bad	☐ Bored	☐ Calm	☐ Cheerful
☐ Confused	☐ Cool	☐ Cozy	☐ Daring
☐ Desire	☐ Disappointed	☐ Disgusted	☐ Dissatisfied
☐ Eager	☐ Energetic	☐ Enjoyment	☐ Excited
☐ Fear	☐ Free	☐ Friendly	☐ Glad
☐ Good	☐ Happy	☐ Hope	☐ Interested
☐ Joyful	☐ Loving	☐ Mild	☐ Nervous
☐ Peaceful	☐ Pleasant	☐ Pleased	☐ Powerful
☐ Pride	☐ Quiet	☐ Relief	☐ Sad
☐ Safe	☐ Silly	☐ Satisfied	☐ Surprised
☐ Thankful	☐ Tired	☐ Ugly	☐ Upset
☐ Weird	☐ Wild	☐ Worried	☐ None of these feelings

Next

Current Emotion - Emojis

Here are some faces that may tell how you feel.
Look at the faces and click on the faces that match how you feel.

How do you feel right now? (Choose as many faces as you need)

"???" does not display on the questionnaire when running and indicates that the order of the emojis is randomized

Sample Questions

Sample questions were repeated for all eight samples.

Sample Wait Screen

For the next few questions, we want to know what you think about Sample Name 1.

Click *next* to continue.

Next

Break Activity – Cycle Four

A timed break with an optional activity was included after the third sample evaluation.

Break Activity Puzzle

Take a break for a minute and solve these brain teasers! You can write down your answers on the pencil and paper provided.

1	2	3
ABCDEFGHIJKLM NOPQRSTVWXYZ	give get give get give get give get	TAILR RIALT AIRTL TLRIA

When the timer is done, click "next" to reveal the answers.

0:56

Next

Break Activity Puzzle Answers

Break Activity – Cycle Seven

A timed break with an optional activity was included after the sixth sample evaluation.

Break Activity Puzzle

Break Activity Puzzle Answers

Here are the answers:
1. Try to Understand
2. You're Full of Baloney
3. Space Invaders

Please click "next" to answer a few questions about Sample Name 1.

Sample Familiarity and Image Liking

Please look at the picture of **Sample Name 1** below.

Have you ever tried **Sample Name 1**?

Sample

☐ Yes

☐ No

☐ I'm not sure

How would you describe the **Sample Name 1** in this picture?

Super Bad	Really Bad	Bad	Just a Little Bad	Maybe Good or Maybe Bad	Just a Little Good	Good	Really Good	Super Good

Next

Sample Name 1 pipes in the sample name (e.g. fresh spinach, lychee gummy candy).

The sample graphic pipes in an image of the food or beverage corresponding with the sample name.

Sample Image – Emotion Words

Sample Name 1 pipes in the sample name (e.g. fresh spinach, lychee gummy candy).

The sample graphic pipes in an image of the food or beverage corresponding with the sample name.

Sample Image - Emojis

Sample Name 1 pipes in the sample name (e.g. fresh spinach, lychee gummy candy).
The sample graphic pipes in an image of the food or beverage corresponding with the sample name.
"???" does not display on the questionnaire when running and indicates that the order of the emojis is randomized

185

Last Cycle

Last cycle questions were asked after children had answered sample questions about all eight samples.

Emotion Word Valence

We want to know what you think about these words used to describe how you feel. **For each word, choose if it is positive, negative, neutral/so-so, or you don't know.**

To put a word into a category, hold down on the word and drag it to the box that fits best.

Positive	Negative	Neutral or So-so	I don't know

Active	Adventurous	Amazed	Anger	Bad	Bored
Calm	Cheerful	Confused	Cool	Cozy	Daring
Desire	Disappointed	Disgusted	Dissatisfied	Eager	Energetic
Enjoyment	Excited	Fear	Free	Friendly	Glad
Good	Happy	Hope	Interested	Joyful	Loving
Mild	Nervous	Peaceful	Pleasant	Pleased	Powerful
Pride	Quiet	Relief	Sad	Safe	Silly
Satisfied	Surpised	Thankful	Tired	Ugly	Upset
Weird	Wild	Worried			

Next

Emoji Valence

"???" does not display on the questionnaire when running and indicates that the order of the emojis is randomized

Participant Demographics

Thank you for your responses! Please answer the following questions about yourself and this survey.

How old are you today?

- [ ] 7 years old
- [ ] 8 years old
- [ ] 9 years old
- [ ] 10 years old
- [ ] 11 years old

What is your gender?

- [ ] Boy
- [ ] Girl

Next

Survey Feedback

Survey Liking

How would you describe this ==survey==?

Super Bad	Really Bad	Bad	Just a Little Bad	Maybe Good or Maybe Bad	Just a Little Good	Good	Really Good	Super Good
⬚	⬚	⬚	⬚	⬚	⬚	⬚	⬚	⬚

Next

Survey Liking Open-End

What did you **like** about this survey?

What did you **dislike** about this survey?

Next

Survey Difficulty

How hard or easy did you find this survey?

☐   Really hard

☐   A little hard

☐   Maybe hard or maybe easy

☐   A little easy

☐   Really easy

Next

Survey Difficulty Open-End

What was **hard** about this survey? Please be as specific as possible.

Next

This question displayed if the child selected "really hard", "a little hard", or "maybe hard or maybe easy".

Study Conclusion

Thank you very much for completing this survey!

Please sign out.

Return to the check-out table with your login card.

Finished

Appendix D - U.S. Actual Food Study Questionnaire (Chapters 4, 5, & 7)

Study Introduction

Favorite and Disliked Foods (Open-End)

Favorite Food – Emotion Words

Here are some words that may tell how a food makes you feel.
Read the words and click on the words that match how the food makes you feel.

How does ${WILDCARD1} make you feel? (Choose as many words as you need)

Active	Adventurous	Amazed	Anger
Bad	Bored	Calm	Cheerful
Cool	Cozy	Disappointed	Disgusted
Enjoyment	Excited	Free	Friendly
Glad	Good	Happy	Joyful
Peaceful	Pleasant	Pleased	Powerful
Sad	Satisfied	Thankful	Upset
None of these feelings			

Next

${WILDCARD1} pipes in the child's response to the favorite food open-end question.

Favorite Food - Emojis

${WILDCARD1} pipes in the child's response to the favorite food open-end question.

"???" does not display on the questionnaire when running and indicates that the order of the emojis is randomized

**Disliked Food – Emotion Words**

Here are some words that may tell how a food makes you feel.
Read the words and click on the words that match how the food makes you feel.

How does ${WILDCARD1} make you feel? (Choose as many words as you need)

☐ Active	☐ Adventurous	☐ Amazed	☐ Anger
☐ Bad	☐ Bored	☐ Calm	☐ Cheerful
☐ Cool	☐ Cozy	☐ Disappointed	☐ Disgusted
☐ Enjoyment	☐ Excited	☐ Free	☐ Friendly
☐ Glad	☐ Good	☐ Happy	☐ Joyful
☐ Peaceful	☐ Pleasant	☐ Pleased	☐ Powerful
☐ Sad	☐ Satisfied	☐ Thankful	☐ Upset
☐ None of these feelings			

Next

${WILDCARD1} pipes in the child's response to the disliked food open-end question.

Disliked Food - Emojis

Here are some faces that may tell how a food makes you feel.
Look at the faces and click on the faces that match how the food makes you feel.

How does ${WILDCARD1} make you feel? (Choose as many faces as you need)

${WILDCARD1} pipes in the child's response to the disliked food open-end question.

"???" does not display on the questionnaire when running and indicates that the order of the emojis is randomized

Current Emotion – Emotion Words

Here are some words that may tell how you feel.
Read the words and click on the words that match how you feel.

How do you feel right now? (Choose as many words as you need)

☐ Active	☐ Adventurous	☐ Amazed	☐ Anger
☐ Bad	☐ Bored	☐ Calm	☐ Cheerful
☐ Cool	☐ Cozy	☐ Disappointed	☐ Disgusted
☐ Enjoyment	☐ Excited	☐ Free	☐ Friendly
☐ Glad	☐ Good	☐ Happy	☐ Joyful
☐ Peaceful	☐ Pleasant	☐ Pleased	☐ Powerful
☐ Sad	☐ Satisfied	☐ Thankful	☐ Upset
☐ None of these feelings			

Next

Current Emotion - Emojis

Here are some faces that may tell how you feel.
Look at the faces and click on the faces that match how you feel.

How do you feel right now? (Choose as many faces as you need)

"???" does not display on the questionnaire when running and indicates that the order of the emojis is randomized

Sample Questions

Sample questions were repeated for all eight samples.

Sample Wait Screen

For the next few questions, we want to know what you think about Sample Name 1.

While you are waiting for Sample Name 1, take a bite of cracker and a drink of water.

When you have received Sample Name 1, sample **BC111**, click *next* to continue.

DO NOT TASTE YOUR SAMPLE UNTIL INSTRUCTED.

0:29

Next

Sample Name 1 pipes in the sample name (e.g. fresh spinach, lychee gummy candy).

BC111 pipes in the 3-digit code associated with the sample.

Sample Familiarity and Appearance Liking

Please **look** at Sample Name 1 to answer the questions.
Do not try the sample yet.

Have you ever tried **Sample Name 1**?

☐ Yes

☐ No

☐ I'm not sure

Looking at your sample and thinking about trying it, how would you describe the **Sample Name 1**?

Super Bad	Really Bad	Bad	Just a Little Bad	Maybe Good or Maybe Bad	Just a Little Good	Good	Really Good	Super Good

Next

Sample Name 1 pipes in the sample name (e.g. fresh spinach, lychee gummy candy).

Sample Appearance – Emotion Words

Here are some words that may tell how a food makes you feel.
Read the words and click on the words that match how the food makes you feel.

Looking at your sample and thinking about trying it, how does Sample Name 1 make you feel? (Choose as many words as you need)

☐ Active	☐ Adventurous	☐ Amazed	☐ Anger
☐ Bad	☐ Bored	☐ Calm	☐ Cheerful
☐ Cool	☐ Cozy	☐ Disappointed	☐ Disgusted
☐ Enjoyment	☐ Excited	☐ Free	☐ Friendly
☐ Glad	☐ Good	☐ Happy	☐ Joyful
☐ Peaceful	☐ Pleasant	☐ Pleased	☐ Powerful
☐ Sad	☐ Satisfied	☐ Thankful	☐ Upset
☐ None of these feelings			

Next

Sample Name 1 pipes in the sample name (e.g. fresh spinach, lychee gummy candy).

Sample Appearance - Emojis

Sample Name 1 pipes in the sample name (e.g. fresh spinach, lychee gummy candy).

"???" does not display on the questionnaire when running and indicates that the order of the emojis is randomized

Sample Taste Liking

Sample Name 1 pipes in the sample name (e.g. fresh spinach, lychee gummy candy).

Sample Taste - Emotion Words

Sample Name 1 pipes in the sample name (e.g. fresh spinach, lychee gummy candy).

Sample Taste - Emojis

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Sample Name 1 pipes in the sample name (e.g. fresh spinach, lychee gummy candy).

"???" does not display on the questionnaire when running and indicates that the order of the emojis is randomized

Last Cycle

Last cycle questions were asked after children had answered sample questions about all eight samples.

Sample Ranking

Please rank the samples you tried today from MOST LIKED (1st) to LEAST LIKED (8th) by clicking and dragging the name into the box.

Note: The samples are shown in the order you tried them.

1st	2nd	3rd	4th

5th	6th	7th	8th

Sample Name 1   Sample Name 2   Sample Name 3   Sample Name 4   Sample Name 5   Sample Name 6

Sample Name 7   Sample Name 8

Next

Sample name placeholders piped in sample names (e.g. fresh spinach, lychee gummy candy) in the order of sample presentation for each participant.

Willing to Eat Again

Pretend you were given the choice of having the foods you tried for a meal or snack.

For each of the foods, mark the box whether or not you would be <mark>willing to eat it again</mark> for a meal or snack later today.

Willing to eat white grapes again?

Would not eat white grapes again	Might or might not eat white grapes again	Would eat white grapes again

Willing to eat baby carrots again?

Would not eat baby carrots again	Might or might not eat baby carrots again	Would eat baby carrots again

Willing to drink orange juice again?

Would not drink orange juice again	Might or might not drink orange juice again	Would drink orange juice again

Willing to eat fresh spinach again?

Would not eat fresh spinach again	Might or might not eat fresh spinach again	Would eat fresh spinach again

Willing to eat cheddar cheese again?

Would not eat cheddar cheese again	Might or might not eat cheddar cheese again	Would eat cheddar cheese again

Willing to eat white bread again?

Would not eat white bread again	Might or might not eat white bread again	Would eat white bread again

Willing to eat chocolate graham snacks again?

Would not eat chocolate graham snacks again	Might or might not eat chocolate graham snacks again	Would eat chocolate graham snacks again

Willing to eat lychee gummy candy again?

Would not eat lychee gummy candy again	Might or might not eat lychee gummy candy again	Would eat lychee gummy candy again

Next

Participant Demographics

Thank you for your responses! Please answer the following questions about yourself and this survey.

How old are you today?

- [ ] 7 years old
- [ ] 8 years old
- [ ] 9 years old
- [ ] 10 years old
- [ ] 11 years old

What is your gender?

- [ ] Boy
- [ ] Girl

Next

Survey Feedback

Survey Liking

How would you describe the questions in this ==survey==?

Super Bad	Really Bad	Bad	Just a Little Bad	Maybe Good or Maybe Bad	Just a Little Good	Good	Really Good	Super Good
☐	☐	☐	☐	☐	☐	☐	☐	☐

Next

Survey Liking Open-Ends

What did you **like** about the questions in this survey?

What did you **dislike** about the questions in this survey?

Next

Survey Difficulty

Survey Difficulty Open-End

This question displayed if the child selected "really hard", "a little hard", or "maybe hard or maybe easy".

Study Conclusion

Thank you very much for completing this survey!

Please sign out.

Return to the check-out table with your login card.

Finished

Appendix E - Paper Ballot for Testing in Accra, Ghana (Chapters 3, 4, & 6)

Welcome! Thank you for participating in this study!
Today we're going to start with some questions about how you feel and how food makes you feel. We want to know what <u>you</u> think. There are no wrong answers!

1. What is one of your favorite foods? (please write <u>one</u> food or drink in the box below)

<div style="border:1px solid;height:80px;"></div>

<mark>Think about the food or drink in the box when you're answering questions 2 and 3.</mark>

2. *Here are some words that may tell how a food makes you feel. Read the words and mark the words that match how the food makes you feel.*

How does your favorite food make you feel? (Check next to as many words as you need)

□	Active	□	Adventurous	□	Amazed	□	Anger
□	Bad	□	Bored	□	Calm	□	Cheerful
□	Cool	□	Cozy	□	Disappointed	□	Disgusted
□	Enjoyment	□	Excited	□	Free	□	Friendly
□	Glad	□	Good	□	Happy	□	Joyful
□	Peaceful	□	Pleasant	□	Pleased	□	Powerful
□	Sad	□	Satisfied	□	Thankful	□	Upset
□	None of these feelings						

3. *Here are some faces that may tell how a food makes you feel. Look at the faces and mark the faces that match how the food makes you feel.*

How does your favorite food make you feel? (Check next to as many faces as you need)

211

4. What is a food that you really don't like? (please write <u>one</u> food or drink in the box below)

```
┌──────────────────────────────────────────┐
│                                          │
│                                          │
│                                          │
└──────────────────────────────────────────┘
```

5. *Here are some words that may tell how a food makes you feel. Read the words and mark the words that match how the food makes you feel.*

    How does the food you don't like make you feel? (Check next to as many words as you need)

☐ Active	☐ Adventurous	☐ Amazed	☐ Anger
☐ Bad	☐ Bored	☐ Calm	☐ Cheerful
☐ Cool	☐ Cozy	☐ Disappointed	☐ Disgusted
☐ Enjoyment	☐ Excited	☐ Free	☐ Friendly
☐ Glad	☐ Good	☐ Happy	☐ Joyful
☐ Peaceful	☐ Pleasant	☐ Pleased	☐ Powerful
☐ Sad	☐ Satisfied	☐ Thankful	☐ Upset
☐ None of these feelings			

6. *Here are some faces that may tell how a food makes you feel. Look at the faces and mark the faces that match how the food makes you feel.*

    How does the food you don't like make you feel? (Check next to as many faces as you need)

212

7. *Here are some words that may tell how you feel. Read the words and mark the words that match how you feel.*

How do you feel <u>right now</u>? (Check next to as many words as you need)

□ Active	□ Adventurous	□ Amazed	□ Anger
□ Bad	□ Bored	□ Calm	□ Cheerful
□ Cool	□ Cozy	□ Disappointed	□ Disgusted
□ Enjoyment	□ Excited	□ Free	□ Friendly
□ Glad	□ Good	□ Happy	□ Joyful
□ Peaceful	□ Pleasant	□ Pleased	□ Powerful
□ Sad	□ Satisfied	□ Thankful	□ Upset
□ None of these feelings			

8. *Here are some faces that may tell how you feel. Look at the faces and mark the faces that match how you feel.*

How do you feel <u>right now</u>? (Check next to as many faces as you need)

_____

For the next few questions, we want to know what you think about <mark>chocolate graham snacks</mark>.

Please turn the page to continue.

Please <mark>look</mark> at the picture of chocolate graham snacks below to answer the following questions.

9. Have you ever tried chocolate graham snacks? (mark one choice)
   - ☐ Yes
   - ☐ No
   - ☐ I'm not sure

10. ==Looking== at the picture, how would you describe the chocolate graham snacks in this picture? (circle one choice)

Super Bad	Really Bad	Bad	Just a Little Bad	Maybe Good or Maybe Bad	Just a Little Good	Good	Really Good	Super Good

11. *Here are some words that may tell how a food makes you feel. Read the words and mark the words that match how the food makes you feel.*

Looking at the picture and thinking about trying it, how do ==chocolate graham snacks== make you feel? (Check next to as many words as you need)

☐ Active	☐ Adventurous	☐ Amazed	☐ Anger
☐ Bad	☐ Bored	☐ Calm	☐ Cheerful
☐ Cool	☐ Cozy	☐ Disappointed	☐ Disgusted
☐ Enjoyment	☐ Excited	☐ Free	☐ Friendly
☐ Glad	☐ Good	☐ Happy	☐ Joyful
☐ Peaceful	☐ Pleasant	☐ Pleased	☐ Powerful
☐ Sad	☐ Satisfied	☐ Thankful	☐ Upset
☐ None of these feelings			

12. *Here are some faces that may tell how a food makes you feel. Look at the faces and mark the faces that match how the food makes you feel.*

Looking at the picture and thinking about trying it, how do <mark>chocolate graham snacks</mark> make you feel? (Check next to as many faces as you need)

☐	😀	☐	😊	☐	☺️	☐	🙂	☐	😉	☐	😍
☐	😦	☐	😛	☐	😳	☐	😌	☐	😒	☐	😕
☐	☹️	☐	😑	☐	😢	☐	😫	☐	😭	☐	😋
☐	😓	☐	😓	☐	😰	☐	😬	☐	😎	☐	😱
☐	😠	☐	😡	☐	😖	☐	😩	☐	None of these faces		

_____

For the next few questions, we want to know what you think about <mark>fresh spinach</mark>.

Please turn the page to continue.

Please look at the picture of fresh spinach below to answer the following questions.

13. Have you ever tried fresh spinach? (mark one choice)
    - ☐ Yes
    - ☐ No
    - ☐ I'm not sure

14. **Looking** at the picture, how would you describe the fresh spinach in this picture? (circle one choice)

Super Bad	Really Bad	Bad	Just a Little Bad	Maybe Good or Maybe Bad	Just a Little Good	Good	Really Good	Super Good

15. *Here are some words that may tell how a food makes you feel. Read the words and mark the words that match how the food makes you feel.*

    Looking at the picture and thinking about trying it, how does fresh spinach make you feel? (Check next to as many words as you need)

☐ Active	☐ Adventurous	☐ Amazed	☐ Anger
☐ Bad	☐ Bored	☐ Calm	☐ Cheerful
☐ Cool	☐ Cozy	☐ Disappointed	☐ Disgusted
☐ Enjoyment	☐ Excited	☐ Free	☐ Friendly
☐ Glad	☐ Good	☐ Happy	☐ Joyful
☐ Peaceful	☐ Pleasant	☐ Pleased	☐ Powerful
☐ Sad	☐ Satisfied	☐ Thankful	☐ Upset
☐ None of these feelings			

16. *Here are some faces that may tell how a food makes you feel. Look at the faces and mark the faces that match how the food makes you feel.*

Looking at the picture and thinking about trying it, how does <mark>fresh spinach</mark> make you feel? (Check next to as many faces as you need)

☐	😀	☐	😊	☐	☺️	☐	🙂	☐	😉	☐	😍
☐	😦	☐	😛	☐	😳	☐	😌	☐	😒	☐	😕
☐	☹️	☐	😑	☐	😢	☐	😣	☐	😭	☐	😋
☐	😥	☐	😓	☐	😰	☐	😬	☐	😎	☐	😱
☐	😠	☐	😡	☐	😖	☐	😩	☐	None of these faces		

_____

For the next few questions, we want to know what you think about <mark>white grapes</mark>.

Please turn the page to continue.

Please <mark>look</mark> at the picture of white grapes below to answer the following questions.

17. Have you ever tried white grapes? (mark one choice)
    - ☐ Yes
    - ☐ No
    - ☐ I'm not sure

18. <mark>Looking</mark> at the picture, how would you describe the white grapes in this picture? (circle one choice)

Super Bad	Really Bad	Bad	Just a Little Bad	Maybe Good or Maybe Bad	Just a Little Good	Good	Really Good	Super Good

19. *Here are some words that may tell how a food makes you feel. Read the words and mark the words that match how the food makes you feel.*

    Looking at the picture and thinking about trying it, how do <mark>white grapes</mark> make you feel? (Check next to as many words as you need)

□ Active	□ Adventurous	□ Amazed	□ Anger
□ Bad	□ Bored	□ Calm	□ Cheerful
□ Cool	□ Cozy	□ Disappointed	□ Disgusted
□ Enjoyment	□ Excited	□ Free	□ Friendly
□ Glad	□ Good	□ Happy	□ Joyful
□ Peaceful	□ Pleasant	□ Pleased	□ Powerful
□ Sad	□ Satisfied	□ Thankful	□ Upset
□ None of these feelings			

20. *Here are some faces that may tell how a food makes you feel. Look at the faces and mark the faces that match how the food makes you feel.*

<u>Looking</u> at the picture and thinking about trying it, how do white grapes make you feel? (Check next to as many faces as you need)

☐	😀	☐	😊	☐	☺️	☐	🙂	☐	😉	☐	😍
☐	😧	☐	😛	☐	😳	☐	😌	☐	😒	☐	😕
☐	☹️	☐	😑	☐	😢	☐	😣	☐	😭	☐	😋
☐	😥	☐	😰	☐	😨	☐	😬	☐	😎	☐	😱
☐	😠	☐	😡	☐	😖	☐	😩	☐	None of these faces		

_____

For the next few questions, we want to know what you think about cheddar cheese.

Please turn the page to continue.

Please look at the picture of cheddar cheese below to answer the following questions.

21. Have you ever tried cheddar cheese? (mark one choice)
    - ☐ Yes
    - ☐ No
    - ☐ I'm not sure

22. Looking at the picture, how would you describe the cheddar cheese in this picture? (circle one choice)

Super Bad	Really Bad	Bad	Just a Little Bad	Maybe Good or Maybe Bad	Just a Little Good	Good	Really Good	Super Good

23. *Here are some words that may tell how a food makes you feel. Read the words and mark the words that match how the food makes you feel.*

    Looking at the picture and thinking about trying it, how does cheddar cheese make you feel? (Check next to as many words as you need)

☐ Active	☐ Adventurous	☐ Amazed	☐ Anger
☐ Bad	☐ Bored	☐ Calm	☐ Cheerful
☐ Cool	☐ Cozy	☐ Disappointed	☐ Disgusted
☐ Enjoyment	☐ Excited	☐ Free	☐ Friendly
☐ Glad	☐ Good	☐ Happy	☐ Joyful
☐ Peaceful	☐ Pleasant	☐ Pleased	☐ Powerful
☐ Sad	☐ Satisfied	☐ Thankful	☐ Upset
☐ None of these feelings			

24. *Here are some faces that may tell how a food makes you feel. Look at the faces and mark the faces that match how the food makes you feel.*

<u>Looking</u> at the picture and thinking about trying it, how does <mark>cheddar cheese</mark> make you feel? (Check next to as many faces as you need)

☐	😀	☐	😊	☐	☺️	☐	🙂	☐	😉	☐	😍
☐	😦	☐	😛	☐	😳	☐	😌	☐	😒	☐	😕
☐	🙁	☐	😑	☐	😢	☐	😣	☐	😭	☐	😋
☐	😓	☐	😰	☐	😨	☐	😬	☐	😎	☐	😱
☐	😠	☐	😡	☐	😖	☐	😩	☐	None of these faces		

_____

For the next few questions, we want to know what you think about <mark>orange juice</mark>.

Please turn the page to continue.

Please <mark>look</mark> at the picture of orange juice below to answer the following questions.

25. Have you ever tried orange juice? (mark one choice)

☐ Yes

☐ No
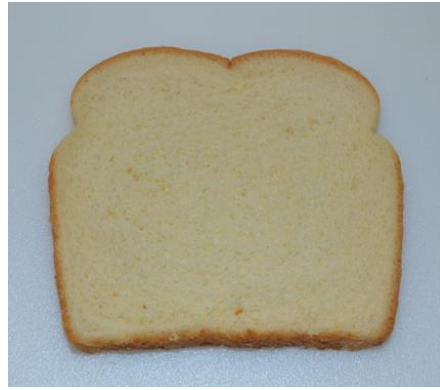
☐ I'm not sure

26. <mark>Looking</mark> at the picture, how would you describe the orange juice in this picture? (circle one choice)

Super Bad	Really Bad	Bad	Just a Little Bad	Maybe Good or Maybe Bad	Just a Little Good	Good	Really Good	Super Good

27. *Here are some words that may tell how a food makes you feel. Read the words and mark the words that match how the food makes you feel.*

<u>Looking</u> at the picture and thinking about trying it, how does <mark>orange juice</mark> make you feel? (Check next to as many words as you need)

☐ Active	☐ Adventurous	☐ Amazed	☐ Anger
☐ Bad	☐ Bored	☐ Calm	☐ Cheerful
☐ Cool	☐ Cozy	☐ Disappointed	☐ Disgusted
☐ Enjoyment	☐ Excited	☐ Free	☐ Friendly
☐ Glad	☐ Good	☐ Happy	☐ Joyful
☐ Peaceful	☐ Pleasant	☐ Pleased	☐ Powerful
☐ Sad	☐ Satisfied	☐ Thankful	☐ Upset
☐ None of these feelings			

28. *Here are some faces that may tell how a food makes you feel. Look at the faces and mark the faces that match how the food makes you feel.*

Looking at the picture and thinking about trying it, how does orange juice make you feel? (Check next to as many faces as you need)

☐	😀	☐	😊	☐	☺️	☐	🙂	☐	😉	☐	😍
☐	😧	☐	😛	☐	😳	☐	😌	☐	😒	☐	😕
☐	🙁	☐	😑	☐	😢	☐	😣	☐	😭	☐	😋
☐	😓	☐	😰	☐	😨	☐	😬	☐	😎	☐	😱
☐	😠	☐	😡	☐	😖	☐	😩	☐	None of these faces		

_____

For the next few questions, we want to know what you think about lychee gummy candy.

Please turn the page to continue.

Please <mark>look</mark> at the picture of lychee gummy candy below to answer the following questions.

29.Have you ever tried lychee gummy candy? (mark one choice)

☐ Yes

☐ No

☐ I'm not sure

30. <mark>Looking</mark> at the picture, how would you describe the lychee gummy candy in this picture? (circle one choice)

Super Bad	Really Bad	Bad	Just a Little Bad	Maybe Good or Maybe Bad	Just a Little Good	Good	Really Good	Super Good

31.*Here are some words that may tell how a food makes you feel. Read the words and mark the words that match how the food makes you feel.*

Looking at the picture and thinking about trying it, how does <mark>lychee gummy candy</mark> make you feel? (Check next to as many words as you need)

☐ Active	☐ Adventurous	☐ Amazed	☐ Anger
☐ Bad	☐ Bored	☐ Calm	☐ Cheerful
☐ Cool	☐ Cozy	☐ Disappointed	☐ Disgusted
☐ Enjoyment	☐ Excited	☐ Free	☐ Friendly
☐ Glad	☐ Good	☐ Happy	☐ Joyful
☐ Peaceful	☐ Pleasant	☐ Pleased	☐ Powerful
☐ Sad	☐ Satisfied	☐ Thankful	☐ Upset
☐ None of these feelings			

32. *Here are some faces that may tell how a food makes you feel. Look at the faces and mark the faces that match how the food makes you feel.*

Looking **at the picture and thinking about trying it, how does lychee gummy candy make you feel?** (Check next to as many faces as you need)

☐	😀	☐	😊	☐	☺️	☐	🙂	☐	😉	☐	😍
☐	😦	☐	😛	☐	😳	☐	😌	☐	😏	☐	😕
☐	🙁	☐	😑	☐	😢	☐	😣	☐	😭	☐	😋
☐	😓	☐	😰	☐	😨	☐	😬	☐	😎	☐	😱
☐	😠	☐	😡	☐	😖	☐	😩	☐	None of these faces		

_____

For the next few questions, we want to know what you think about baby carrots.

Please turn the page to continue.

Please look at the picture of baby carrots below to answer the following questions.

33. Have you ever tried baby carrots? (mark one choice)
   - ☐ Yes
   - ☐ No
   - ☐ I'm not sure

34. <mark>Looking</mark> at the picture, how would you describe the baby carrots in this picture? (circle one choice)

Super Bad	Really Bad	Bad	Just a Little Bad	Maybe Good or Maybe Bad	Just a Little Good	Good	Really Good	Super Good

35. *Here are some words that may tell how a food makes you feel. Read the words and mark the words that match how the food makes you feel.*

   Looking at the picture and thinking about trying it, how do <mark>baby carrots</mark> make you feel? (Check next to as many words as you need)

☐ Active	☐ Adventurous	☐ Amazed	☐ Anger
☐ Bad	☐ Bored	☐ Calm	☐ Cheerful
☐ Cool	☐ Cozy	☐ Disappointed	☐ Disgusted
☐ Enjoyment	☐ Excited	☐ Free	☐ Friendly
☐ Glad	☐ Good	☐ Happy	☐ Joyful
☐ Peaceful	☐ Pleasant	☐ Pleased	☐ Powerful
☐ Sad	☐ Satisfied	☐ Thankful	☐ Upset
☐ None of these feelings			

36. *Here are some faces that may tell how a food makes you feel. Look at the faces and mark the faces that match how the food makes you feel.*

Looking at the picture and thinking about trying it, how do baby carrots make you feel? (Check next to as many faces as you need)

☐	😀	☐	😊	☐	☺	☐	🙂	☐	😉	☐	😍
☐	😦	☐	😛	☐	😳	☐	😌	☐	😒	☐	😕
☐	🙁	☐	😑	☐	😢	☐	😣	☐	😭	☐	😋
☐	😓	☐	😰	☐	😨	☐	😬	☐	😎	☐	😱
☐	😠	☐	😡	☐	😖	☐	😩	☐	None of these faces		

_____

For the next few questions, we want to know what you think about white bread.

Please turn the page to continue.

Please <mark>look</mark> at the picture of white bread below to answer the following questions.
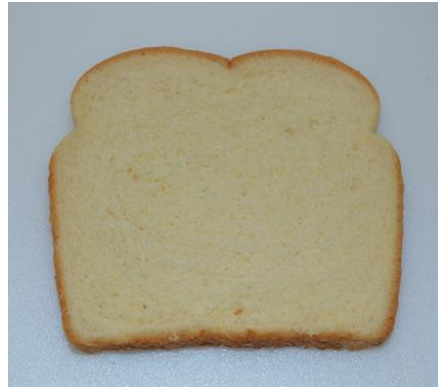
37. Have you ever tried white bread? (mark one choice)
    - ☐ Yes
    - ☐ No
    - ☐ I'm not sure

38. <mark>Looking</mark> at the picture, how would you describe the white bread in this picture? (circle one choice)

Super Bad	Really Bad	Bad	Just a Little Bad	Maybe Good or Maybe Bad	Just a Little Good	Good	Really Good	Super Good

39. *Here are some words that may tell how a food makes you feel. Read the words and mark the words that match how the food makes you feel.*

   Looking at the picture and thinking about trying it, how does <mark>white bread</mark> make you feel? (Check next to as many words as you need)

☐ Active	☐ Adventurous	☐ Amazed	☐ Anger
☐ Bad	☐ Bored	☐ Calm	☐ Cheerful
☐ Cool	☐ Cozy	☐ Disappointed	☐ Disgusted
☐ Enjoyment	☐ Excited	☐ Free	☐ Friendly
☐ Glad	☐ Good	☐ Happy	☐ Joyful
☐ Peaceful	☐ Pleasant	☐ Pleased	☐ Powerful
☐ Sad	☐ Satisfied	☐ Thankful	☐ Upset
☐ None of these feelings			

40. *Here are some faces that may tell how a food makes you feel. Look at the faces and mark the faces that match how the food makes you feel.*

Looking at the picture and thinking about trying it, how do <mark>white bread</mark> make you feel? (Check next to as many faces as you need)

☐	😀	☐	😊	☐	☺️	☐	😶	☐	😉	☐	😍
☐	😦	☐	😛	☐	😳	☐	😌	☐	😒	☐	😕
☐	🙁	☐	😑	☐	😢	☐	😣	☐	😭	☐	😋
☐	😥	☐	😓	☐	😰	☐	😬	☐	😎	☐	😱
☐	😠	☐	😡	☐	😖	☐	😩	☐	None of these faces		

41. Please rank the foods you saw today from MOST LIKED (1st) to LEAST LIKED (8th). Write one sample name in each space below:

Samples:

Chocolate graham snacks	Fresh spinach	White grapes	Cheddar cheese
Orange juice	Lychee gummy candy	Baby carrots	White bread

(MOST LIKED) 1st:_____

2nd:_____

3rd:_____

4th:_____

5th:_____

6th:_____

7th:_____

(LEAST LIKED) 8th:_____

42. Imagine you were given the choice of having the foods you saw for a meal or snack. For <u>each</u> of the foods, check whether or not you would be willing to eat it for a meal or snack later today.

	Would NOT eat	Might or might not eat	WOULD eat
Chocolate graham snacks	☐	☐	☐
Fresh spinach	☐	☐	☐
White grapes	☐	☐	☐
Cheddar cheese	☐	☐	☐
Orange juice	☐	☐	☐
Lychee gummy candy	☐	☐	☐
Baby carrots	☐	☐	☐
White bread	☐	☐	☐

43. We want to know what you think about the words used to describe how you feel. For each word, choose if it is positive, negative, neutral/so-so, or you don't know.

	Positive	Negative	Neutral or so-so	I don't know		Positive	Negative	Neutral or so-so	I don't know
Active	☐	☐	☐	☐	Free	☐	☐	☐	☐
Adventurous	☐	☐	☐	☐	Friendly	☐	☐	☐	☐
Amazed	☐	☐	☐	☐	Glad	☐	☐	☐	☐
Anger	☐	☐	☐	☐	Good	☐	☐	☐	☐
Bad	☐	☐	☐	☐	Happy	☐	☐	☐	☐
Bored	☐	☐	☐	☐	Joyful	☐	☐	☐	☐
Calm	☐	☐	☐	☐	Peaceful	☐	☐	☐	☐
Cheerful	☐	☐	☐	☐	Pleasant	☐	☐	☐	☐
Cool	☐	☐	☐	☐	Pleased	☐	☐	☐	☐
Cozy	☐	☐	☐	☐	Powerful	☐	☐	☐	☐
Disappointed	☐	☐	☐	☐	Sad	☐	☐	☐	☐
Disgusted	☐	☐	☐	☐	Satisfied	☐	☐	☐	☐
Enjoyment	☐	☐	☐	☐	Thankful	☐	☐	☐	☐
Excited	☐	☐	☐	☐	Upset	☐	☐	☐	☐

44. We want to know what you think about the faces used to describe how you feel. For each face, choose if it is positive, negative, neutral/so-so or you don't know.

	Positive	Negative	Neutral or so-so	I don't know
😀	☐	☐	☐	☐
😊	☐	☐	☐	☐
☺️	☐	☐	☐	☐
🙂	☐	☐	☐	☐
😉	☐	☐	☐	☐
😍	☐	☐	☐	☐
😮	☐	☐	☐	☐
😛	☐	☐	☐	☐
😳	☐	☐	☐	☐
😌	☐	☐	☐	☐
😒	☐	☐	☐	☐
😟	☐	☐	☐	☐
😕	☐	☐	☐	☐
😑	☐	☐	☐	☐

	Positive	Negative	Neutral or so-so	I don't know
😢	☐	☐	☐	☐
😣	☐	☐	☐	☐
😭	☐	☐	☐	☐
😋	☐	☐	☐	☐
😅	☐	☐	☐	☐
😰	☐	☐	☐	☐
😨	☐	☐	☐	☐
😬	☐	☐	☐	☐
😎	☐	☐	☐	☐
😱	☐	☐	☐	☐
😡	☐	☐	☐	☐
😠	☐	☐	☐	☐
😖	☐	☐	☐	☐
😩	☐	☐	☐	☐

45. What is your gender?
☐ Boy
☐ Girl

46. How would you describe the questions in this survey? (circle one choice)

Super Bad	Really Bad	Bad	Just a Little Bad	Maybe Good or Maybe Bad	Just a Little Good	Good	Really Good	Super Good

47. What did you like about the **questions** in this survey?

48. What did you dislike about the **questions** in this survey?

49. How hard or easy did you find this survey? (circle one choice)

Really hard	A little hard	Maybe hard or maybe easy	A little easy	Really easy

50. What, if anything, was <u>hard</u> about this survey?