Categorizing Health-Related Cues to Action: Using Yelp Reviews of Restaurants in Hawaii,

Weranuj Ariyasriwatana, Wayne Buente, Melissa Oshiro, Dennis Streveler

University of Hawaii, USA

0107

The Asian Conference on Media and Mass Communication 2013

Official Conference Proceedings 2013

Abstract

Yelp's ability to reflect consumers' real voices has been questioned (Kuehn, 2013), yet this social media site—with a platform built around consumer reviews— appears to exert a strong influence on consumers' restaurant and food choice (Luca, 2011). Unhealthy food choice, influenced by a variety of social and behavioral factors, tremendously contributes to the ongoing obesity epidemic (Nestle et al., 1998). More than one-third of U.S. adults are considered overweight (CDC, n.d.), a precursor state that may lead to obesity, itself a chronic disease accompanied by many comorbid conditions (Burke & Wang, 2011).

There has been no scholarly work that utilizes restaurant reviews on Yelp in order to facilitate and influence consumers toward making healthier food choices. Our paper is an attempt to understand ever-changing consumer behaviors that revolve around food choices using a qualitative content analysis of Yelp restaurant reviews.

We qualitatively categorize 'health-related cues to action'—indicating the relationship to the Health Belief Model's 'cues to action'—for food choices. A stratified sampling technique was used in an attempt to fairly represent both healthy and unhealthy restaurants on Hawaii's Island of Oahu. The two main categories of health-related cues to action derived from our analysis are ones that signify healthy food choice and ones that signify unhealthy food choice. This work may be very useful for future studies, e.g., in discovering health-related food choice trends; creating a codebook that can be used in Yelp restaurant review quantitative content analysis to validate such trends; and in developing a method to get convincing data for making a credible suggestion to Yelp, relevant social media, policy makers, and food corporations. In conclusion, this study may introduce a refreshing way to help inspire consumers to make healthier food choices.

INTRODUCTION

Food choice—which is influenced by a variety of social and behavioral factors—tremendously contributes to the obesity epidemic (Nestle et al., 1998). Obesity is a chronic disease accompanied by many comorbid conditions. In the U.S., more than one-third of U.S. adults are considered overweight (Centers for Disease Control and Prevention, n.d.), a precondition of obesity. Empirical data demonstrate that restaurant reviews from the social media site Yelp affect food choices among consumers (Luca, 2011). We believe that a retrospective study of restaurant reviews on Yelp may uncover reasons behind different kinds of food choices. This study is a first step in lessening the burden of obesity resulting from poor food choice. This paper will address the following research questions: Can suitable categories be found based on health-related commentaries in restaurant reviews of a social media website (Yelp)? If so, what are these categories? Can these categories be interpreted as "cues to action"—potentially leading Yelp's readers to healthier food choices?

LITERATURE REVIEW

Online Consumer Reviews

We look at the nature of new media that changes the way consumers assess products. Then, we discuss consumer reviews, different factors for appraising online reviews, and how people process information in cyberspace.

Before making a purchase, consumers apply criteria that contribute to how they evaluate product performance. Previous research has shown that products can be classified as search products or experience products (Girard, Silverblatt, & Korgaonkar, 2002; Nelson, 1970). Search products can be precisely "evaluated prior to purchase because they are characterized by concrete and functional attributes for which valid information can be obtained before product use" while experience products "are dominated by intangible attributes that cannot be known until purchase, and for which performance evaluations can be verified only by (sensory) experience or consumption" (Willemsen, Neijens, Bronner, & Ridder, 2011, p. 22-23). According to these definitions, food and restaurants are considered experience products. With the new interactive media that provide "virtual experience" and possibly lower a consumer's perceived risk, an experience product can be virtually turned into a search product (Klein, 1998).

Consumer perceptions of products are also influenced by social factors. In dealing with the plethora and sophistication of information on the Web, people rely on others for credibility assessments of information or source (Metzger, Flanagin, & Medders, 2010). They do so by using group-based tools that are also web-based applications, e.g., online ratings, reputation systems, and social network sites. Consumer reviews play a crucial role in consumer decision-making because social-based information is the most impactful cue on final trustworthiness judgments (Utz, Kerkhof, & van den Bos, 2012).

In evaluating online reviews, there are various elements to consider: content of the review, quality of the review, quantity of the review, and information source (website that hosts the review, layperson, self-claimed expert, and peer-rating based expert). Willemsen et al. (2011)'s study reveals that there is a positive relationship between perceived usefulness of a review and expertise claims; both negative and positive arguments add to a higher perceived usefulness (reviews with high levels of argument diversity and density are perceived as more

useful); and the negative effect (or psychological phenomenon that negative information is weighted more than positive one) was found only for experience products. Reviews are not equally created; therefore, they are not equally evaluated—this explains the relation of differences in the perceived usefulness of reviews and differences in the content of reviews (Willemsen et al., 2011). Pan and Zhang (2011)'s study reveals that review valence and length have a positive relationship with perceived review helpfulness. Restaurant reviews on Yelp can also be considered as online word-of-mouth (WOM). WOM affects the decision-making process of consumers; higher valence (more positive review information) and greater volume (more reviews) lead to an increase in restaurant sales (Lu, Ba, Huang, & Feng, 2013).

Web reputation systems and recommender systems are increasing their essentiality in contemporary lifestyles. Affordances that come with Web 2.0 allow users to share, rate, and review their experiences collectively. Websites like Yahoo Travel, Trip Advisor, and Yelp are examples of "social web" where broader public co-create meaning with an artifact or place (Owens, 2012).

There are relevant theories of how people process information in the digital media environment that account for both the consumer/user attributes along with the social nature of Web 2.0. Warranting principle (Walther & Parks, 2002) suggests that people evaluate online information from considering information that is not easily manipulated by the source. Utz et al. (2012) found that consumer reviews are a better predictor of the trustworthiness of online stores than assurance seals or store reputation—factors that could be controlled by the store. Signaling theory (Donath, 2007) proposes that reliable signals found online are those that are difficult to fake, are intervened by laws and social mores, or are costly to imitate. In addition, individuals interpret signals differently (Donath, 2011). Signaling theory, therefore, indicates that the qualities of information receivers and characteristics of the information source must be taken into consideration (Flanagin & Metzger, 2013). Specific information cues can be especially credible online, as the theory of informational social influence indicates, "people rely on available cues to establish subjective validity under ambiguous circumstances" (Flanagin & Metzger, 2013, p. 1632). Willemsen, Neijens, and Bronner's (2012) study determined that perceived source trustworthiness and perceived source expertise—which are both dimensions of credibility—work separately and have differential effects on attitude formation. In addition to quality of the information, quantity matters as well. Flanagin and Metzger (2013) observed that the higher the information volume, the stronger the trust. People look for experts' opinions in the case of low information volume, while they look for users' opinions in the case of high information volume (Flanagin & Metzger, 2013).

Consumer perception is also influenced by the nature of community contents: marketer-generated content (MGC) or user-generated content (UGC). Compared with Marketer-Generated Content (B2C), online User-Generated Content has a more prominent role in driving purchases (Goh, Heng, & Lin, 2013). Goh et al.'s study (2013) reveals that consumers influence one another's purchase through informative and persuasive interactions, especially undirected approach is more effective for both persuasive and informative consumer-to-consumer communication. Restaurant reviews on Yelp are not directed to any particular user due to its structure; therefore, they should be quite effective in both informing and persuading other consumers.

Social Media and Food Choice

We see social media as an influential communication channel for cues to action—leading to health behaviors—for two reasons: (a) the validity or the truthfulness of online user-generated content, and (b) the personalization with provision of social media.

As noted in the previous section, user-generated content is a highly influential factor in consumer perception and behavior. In the hospitality industry, user-generated rating and content, or "e-word-of-mouth," do have influence on online popularity of restaurants (Zhang, Ye, Law, & Li, 2010). Unlike reviews from editors, which could be advertising in disguise, consumer-generated ratings of restaurants—in aspects of food, service, atmosphere, and volume of online consumer reviews—are positively associated with consumer's intention to visit a restaurant's webpage (Zhang et al., 2010).

New media, such as the Internet and text messages, "should be used to deliver tailored messages to individuals," especially in young adults so that they might be persuaded to make better dietary choices (Brennan et al., 2010, p. 635). Vance, Howe, and Dellavalle (2009) found that Twitter, MySpace, Facebook, and YouTube are the fastest-growing sources of health information among young adults. The study of Nabi, Prestin, and So (2013) indicates that number of Facebook friends is the predictor of "social support and subsequent health benefits" (p. 725). Social media therefore may have the potential to become a powerful tool for realizing healthy food choices.

Yelp.com

Founded in 2004, Yelp has been helping people to select local businesses like hair stylists and restaurants based on reviews from previous consumers. In Q2, 2013, Yelp had approximately 108 million monthly unique visitors (http://www.yelp.com). So far, yelpers have written more than 42 million local reviews. Its reviews consist of star ratings and open-ended comments (Park & Kim, 2008). Within the restaurant industry, Yelp is clearly quite influential. According to Luca's (2011) study, "a one-star increase in Yelp rating leads to a 5-9 percent increase in revenue…driven by independent restaurants," not chain restaurants (p. 2). In fact, revenue share of chain restaurants has declined as a result to an exposure to Yelp reviews (Luca, 2011).

Food reviews on Yelp, especially for new food establishments that the consumers have not tried, are crucial for food choice decision-making. As discussed earlier, consumer perception is heavily swayed by online reviews and comments because they are highly credible. Furthermore, consumers will internalize opinions from others as a way to reduce their situational uncertainty (Burnkrant & Cousineau, 1975). In other words, Yelp reviews are meaningful because they are highly credible and reduce uncertainty given the many restaurant options available to U.S. consumers today.

Even though reviews from Yelp are not absolutely ideal, their richness fascinatingly invites researchers to delve into them. Yelpers have the freedom to write and publish reviews—as long as it is within the ideology of consumption—which can be utilized for this study. In fact, false or deceptive reviews have a higher chance to be protected than civic or political discourses (Kuehn, 2013). Luca and Zervas's (2013) study reveals that there are 16 percent of fraudulent restaurant reviews on Yelp due to weak reputation or increased competition. These reviews tend to be more extreme—favorable for promoting one's restaurant and unfavorable

for destroying the competitors' reputation—than other reviews. Nevertheless, real reviews written by consumers on Yelp seem to be more honest than reviews from other social network sites.

Compared to other social network sites, there might be less tension for reviewers on Yelp to balance personal authenticity and audience expectations. Context collapse is a phenomenon of a social network site that "flattens multiple audiences into one" (Marwick & boyd, 2011) and creates tensions since all various groups of audience are all present (boyd, 2008; Lewis & West, 2009; Marwick & boyd, 2011; West, Lewis, & Currie, 2009). Yelpers might not need to worry about concealing and revealing information in the same regard as Facebook and Twitter users, as the architecture of the site restricts discussion to only food-related topics, e.g., attributes of food, price range, service, or differences of various locations in the case of a chain restaurant. Other contentious topics, such as politics, are not allowed on Yelp. Also, elements that represent traditional forms of identity available on other social network sites, such as religion, occupation, and political affiliation, are absent on Yelp (Kuehn, 2013). Even though reviews on Yelp are written by a particular group of people and some reviews are not even written by consumers, they still reflect and shape how people in society make food choices. Compared to other social media like Facebook and Twitter, these reviews are relatively free from social and political pressure to please their potential audience.

Hawaii as a Context for this Study

Marked by harmonious ethnic relations and an egalitarian perspective, Hawaii's multicultural model can be symbolized by *Okazuya* (Japanese American delicatessens serving a mixture of ethnic foods) and the image of the "mixed plate lunch" (Yano, 2006, p. 39). This is similar to what the publisher of the book *What Hawaii Likes to Eat* describes, "If it's true that we are what we eat, then Hawaii is a genuine melting pot where people meld customs and share traditions on plates full of kimchee, adobo, scalloped potatoes, and a side of rice" (Miura & Shimabukuro, 2007).

Hawaii is not only personified by its tropical climate, immigrants from all continents, outdoor activities, and diverse culinary delights. There are also health concerns among its residents that can be addressed or alleviated by healthy food choices. According to prevalence of self-reported obesity among U.S. adults, 23.6% of adults in Hawaii are obese (Centers for Disease Control and Prevention or CDC, 2013). Consuming fruits and vegetables provides essential nutrients that a human body needs, decreases risks of many chronic diseases, and helps in maintaining a healthy weight (USDA Center for Nutrition Policy and Promotion, 2013). Despite these advantages, many American—and Hawaiian—adults' fruit and vegetable (F&V) consumption fails to meet the guidelines (See Table 1).

Of course, physical activity level is also essential to good health as well but is not in the scope of this study.

Table 1
Percentage of People that Report Consuming Fruits and Vegetables less than one time daily

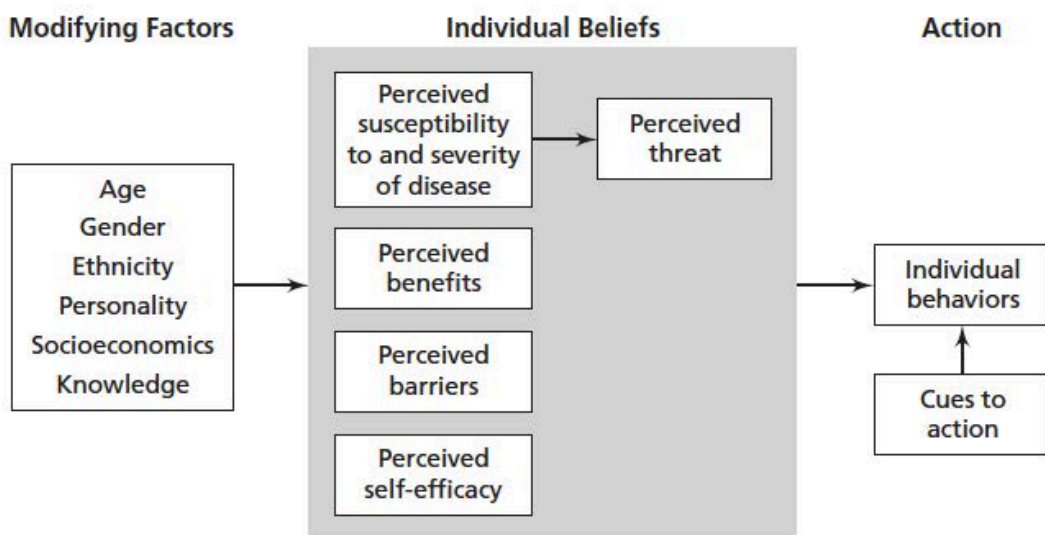|	Adults		Adolescents	
Food Selection	U.S. National	Hawaii	U.S. National	Hawaii
Fruits	37.7	39.5	36.0	45.1
Vegetables	22.6	22.6	37.7	40.8

Source: CDC's National Center for Chronic Disease and Health Promotion, 2013

The Health Belief Model (HBM)

The Health Belief Model (HBM) model contextualizes the importance of health-related cues to action in the area of food choice. Discussing the model facilitates our understanding of why cues to action are important in a larger context. The intent of this study is not to look at HBM as a whole, but to focus on the *action* part, especially *cues to action*.

The HBM explains that an individual's belief influence health behavior. It was developed by the US Public Health Service social psychologists during the 1950s in an attempt to explain why people did not participate in prevention and early detection programs. They fashioned a new behavioral model based on stimulus response (S-R) theory and cognitive theory. In the field of health behavior research, the HBM (see Figure 1) is an often-used framework for explaining change and maintenance of health-related behaviors and guiding health behavior interventions (Champion & Skinner, 2008).

The HBM components and linkages

Figure 1. The Health Belief Model noting the components and linkages between behavioral antecedents and action. Adapted from "The health belief model," by V.L. Champion and C. S. Skinner, 2008, In K. Glanz, B. K. Rimer, & K. Viswanath (Eds.), *Health behavior and health education: Theory, research, and practice* (4th ed., p. 49). USA: Jossey-Bass.

HBM components

Perceived Susceptibility refers to an individual's perception of having a condition or contracting a disease. *Perceived Severity* refers to how serious a person perceives the health problem to be. Perceived susceptibility and severity are labeled together as *Perceived Threat* (Champion & Skinner, 2008). Both of these constructs have a strong cognitive component—making it somewhat dependent on knowledge (Rosenstock, 1974, p. 331). *Perceived Benefits* refer to a personal judgment regarding the benefits of available alternatives that address the perceived threat. *Perceived Barriers* refer to negative aspects of a health action that an individual considers taking. *Self-Efficacy* refers to "the conviction that one can successfully execute the behavior required to produce the outcomes" (Bandura, 1997, p. 193).

"Cues to action" refers to people, things, or events that influence health behavior. They can be perception of bodily states, illness of a family member, advice from other people, mass media campaigns, health information on product labels, and postcards from a healthcare provider (Champion and Skinner, 2008; Hayden & Paterson, 2009; Rosenstock, 1974). In order for any individual to take an action, a strong cue is needed in the case of low threat perception and a weak cue is enough for high threat perception (Rosenstock, 1974). Cues to action will be more influential in "situations where perceived threat and benefits are high and perceived barriers are low" (Champion & Skinner, 2008, p. 62).

"Cues to action" is a construct that is "necessary to complete the model, but it has not been subjected to careful study" (Rosenstock, 1974, p. 332). Champion and Skinner (2008) also found that it is frequently missing from research; therefore, there is limited knowledge about cues to action and their relative impact. The mysterious quality of this construct calls for more studies. Our paper makes a contribution to this literature by specially examining the cues to action component in the HBM.

HBM linkages (relationships among HBM constructs)

There are major constructs that are antecedent to individual behaviors: susceptibility, severity, benefits, barriers, and self-efficacy. The combination of susceptibility and severity equals threat. These main constructs—which are influenced by modifying factors—represent individual beliefs. These beliefs (or perceptions), along with cues to action, lead to behaviors. The HBM has been applied in various ways due to the fact that relationships between and among these constructs are not clearly defined.

Barriers and Facilitators of Healthy Eating

Studying barriers and facilitators of healthy eating helps us better understand behaviors and plan any intervention accordingly. Some barriers to healthy eating are personal taste preferences for, cheapness of, and ease of access to fast food (Shepherd, Harden, Rees, Brunton, Garcia, Oliver, & Oakley, 2006). Facilitators might be a larger availability of healthy foods, support from family, will power, and a desire to look after one's appearance (Shepherd et al., 2006, p. 239). Shepherd et al. (2006) pointed out that there is a possibility for young people to have a healthier eating habit if the availability of affordable healthy food in the residential public and private spaces increased. Given the importance for consumers to make healthy food choices, it is important to explore barriers and facilitators of healthy eating, in the form of health-related cues to action, from Yelp restaurant reviews.

DEFINING CUES TO ACTION IN THIS STUDY

Donath (2006) defines a cue as "everything that we use to infer a hidden quality…A cue is a signal only if it is intended to provide that information" (p. 2). Even though many items can be considered cues to action, the focus of this study will be communication elements: advice from others, in the form of reviews on Yelp.com. Other studies explored the use of language in food writing, e.g., the study of linguistic relationships between food prices and customer sentiment through an analysis of restaurant menus and customer reviews by Chahuneau, Gimpel, Routledge, Scherlis, and Smith (2012). However, our study specifically addresses "health-related cues to action" to indicate association with the HBM.

STUDY OBJECTIVES and PROPOSITIONS

Based on our research question outlined earlier, the study objectives are to identify and categorize health-related cues to action using Yelp reviews of 'healthy' and 'unhealthy' restaurants. We are trying to better understand health-related cues to action people use in restaurant reviews on Yelp. Through Yelpers' reviews about their dining experiences, we will be able to cull and categorize health-related cues to action for food choices. We suspect that health-related cues to action from 'healthy' and 'unhealthy' food establishments might be different. Since true consumption desires are associated with gluttony and calorically rich food that is high in protein and fat, such as meat, fried food, desserts, and soft drinks (LaChance, 2007; Wansink, Kniffin, & Shimizu, 2012), we also anticipate that people are not highly concerned about health (or nutrition) when they dine out. Recent research on Food Away from Home (FAFH) seems to suggest that this is the case. Todd, Mancino and Lin (2010) summarized that Americans spend more of their food budget on food prepared outside of the home than previous times and that the nutritional quality of the food is poorer compared to eating at home.

METHODOLOGY

This is an exploratory study in understanding health-related cues to action on social media. This study takes an approach of conventional qualitative content analysis due to limited theory or research literature of health-related cues to action on social media, a phenomenon of interest (Hsieh & Shannon, 2005). We conducted our study based on the process of qualitative content analysis by Zhang and Wildemuth (2009).

The population under investigation is Yelpers (Yelp contributors) who registered for Yelp accounts and have written reviews for food establishments in Honolulu, HI[1]. They can be anyone, as long as they have eaten and written reviews on such food establishments.

In the data collection process, a stratified sampling technique was used so restaurants on both ends of the health continuum would be fairly represented. To select the sample, the following Boolean keywords were entered into the Yelp search bar: "healthy food" and "unhealthy food." Because the focus of this study is on the inhabitants of Honolulu, HI, search results were limited to "Near Honolulu, HI." Some restaurants that showed up in both searches were eliminated. The first 50 results of each search were assigned numbers. Through a random number generator, we selected ten "healthy food" restaurants and ten "unhealthy food"

---

[1] The web address is http://www.yelp.com/honolulu.

restaurants. For each chosen restaurant, the twenty most recent reviews were then examined or until data saturation is reached. In this study, data saturation occurs when additional reviews do not contribute to any new category formation (Salazar, Crosby, & DiClemente, 2006), although more reviews might increase health-related cues to action. We retrieved at least 400 reviews in mid-April 2013. For each restaurant, the comments were put into a data collection instrument form (see Appendix A). All obvious misspellings were corrected.

The unit of analysis was defined by theme. The coding unit that we selected, from at least 400 reviews of "healthy food" and "unhealthy food" restaurants, is an individual theme or an issue of relevance, which is very common in qualitative content analysis (Zhang & Wildemuth, 2009). Budd, Thorp, and Donohue (1967, p. 34) defined a thematic unit as "…a single thought unit or idea unit that conveys a single item of information extracted from a segment of content." Henri (1991, p. 134) stated, "each analysis will define its own relevant unit of meaning…for content analysis, the essential factor is not form but meaning." Also, a theme can be described as the expressions of an idea (Minichiello, Aroni, Timewell, & Alexander, 1990). For each category of health-related cues to action in this study, we sought various sets of expressions of an idea that may trigger health-related action among audiences of restaurant reviews on Yelp.

The next step developed categories and a coding scheme. With a high degree of inductive reasoning, no preconceived categories are used (Kondracki & Wellman, 2002). We let the categories emerge out of the data through the first and second stages of the constant comparative method of qualitative analysis: (1) comparing incidents applicable to each category, and (2) integrating categories and their properties (Glaser & Strauss, 1967).

Testing coding scheme on a sample of text gave "clarity and consistency" to our category definitions (Zhang & Wildemuth, 2009, p. 4). There were two coders in this study. After going through several samples of reviews together, the two coders discussed which word/phrase/idea should (not) be considered as health-related cues to action to improve inter-rater reliability. For example, "freshly-made French fries," "hot fried rice," and "Macaroni Salad" are not health-related cues to action. Then, each of the two coders separately coded reviews from three restaurants, compared coding for consistency, and revised coding rules correspondingly. It was an iterative process until satisfactory coding consistency was attained (Weber, 1990).

Sequentially, the coders coded all the text based on our finalized coding rules with constant checking so that the codes maintained their meaning. For each restaurant, the coders examined health-related cues to action for the 20 most recent reviews or until data saturation. New categories/concepts that emerged during this step were added to the coding manual. We found some words that are exclusive to the Hawaiian context, e.g., "ono" (Hawaiian word for delicious), "broke da mout" (pidgin phrase, also means delicious), "da bomb" (pidgin term means the best), and "pau" (Hawaiian word means finished or done). Whether they are health-related cues to action or not, we needed to define every local word in the reviews in order to understand the context of the reviews.

The coders rechecked the coding consistency after the coding of all reviews was complete. Since the coders' personal biases were curbed from the earlier stages, this fine-tuning assured the same understanding of the categories.

RESULTS/FINDINGS

Though we were not statistically testing stated hypotheses but rather pursuing an exploratory content analysis, some interesting patterns emerged. There were many health-related words, phrases, sentences, even paragraphs found in all restaurants; these could be feelings of satisfaction in making a healthy food choice or guilt in making an unhealthy choice. Also, some people seem not to be concerned about nutrition when they eat out as many reviews often told a story of unhealthy food "being worth the calories" which may have led to overeating. This was not the case of all reviews, however, as several members were pleased to find healthier options at a traditionally unhealthy restaurant. One reviewer illustrated food options in Hawaii…

> One thing I dislike about food in Hawaii is that cheap food is so unhealthy. I mean, a typical plate lunch is breaded, deep-fried meat with rice, mac[aroni] salad. It's really a nightmare for your blood sugar level. And "mac salad" isn't even salad! And if you want a lighter meal with vegetables, it's usually not filling or a lot more expensive.

Categories of health-related cues to action found in this study are divided into two main groups: ones that signify healthy food choice and ones that signify unhealthy food choice. We summarized categories of health-related cues to action in Table 2. The ideas that reviewers described, either positive or negative experiences, were categorized based on reviewers' perceptions—regardless of traditional definitions of healthy and unhealthy food choices.

There are many health-related cues to action that signify healthy food choice found from reviews of restaurants resulting from the search term 'healthy food' and vice versa; however, both types of health-related cues to action are available in all reviews—either for restaurants resulting from the search term 'healthy food' or 'unhealthy food[2].' There are two possible explanations: (a) a reviewer might write about experiences or thoughts that are not directly related to the food that he/she is supposed to be reviewing, and (b) the healthiness of restaurants is not black and white but a continuum.

Table 2
Preliminary Categorization of Thirteen Health-Related Cues to Action

Category	Ones that	Example	Ones that	Example

---

[2] Unfortunately, due to the proprietary nature of the search algorithm, it is difficult to ascertain how search results are compiled.

	signify healthy food choices		signify unhealthy food choices	
1. Taste (indirectly health-related cues to action)	Surprising that nutritious food tastes good, tastes like meat. Homemade taste Natural taste Tastes like hippie	"If ALL vegetarian/vegan food were dis 'ono [delicious], I'd let my armpits/leg hairs grow out, stop wearing deodorant, and go join the useless Occupy Honolulu movement downtown .... maybe." "Awesome homemade taste" "You sure this shit aint meat? Damn!"	The deliciousness is worth the extra calories. Unhealthy food tastes good.	"…It's the only one worth the calories in my book ;)" "…things that taste really good aren't usually healthy anyway!"
2. Price	The nutrition justifies the price. Expensive - unaffordable to have on a regular basis.	"It seems pricey, but in a way it kinda keeps you from getting more food than you need.	Value for money (quantity wise)	"Cheap" "Great value for money"
3. Portion	Small(er) portion	"The portions look small but because it's so nutritious and flavorful you really don't feel hungry."	Despite that fact that leftover can be saved for another meal, large portion seems to make consumers eat more than they should.	"We both basically stuffed ourselves and still had plenty left over for a FULL second meal the next day." "generous portion"
Category	**Ones that signify healthy food choices**	**Example**	**Ones that signify unhealthy food choices**	**Example**

4. Nutritional Facts	High in Calories, Cholesterol, Trans Fat, Saturated Fat, and Sodium	"…and they have Coke Zero—which many fountain places don't have."	Low or No-Calories, Cholesterol, Trans Fat, Saturated Fat, and Sodium	"Unlimited/refill soda"
5. Type of Food	Vegan/Vegetarian Food, Live Food, Raw Food	"Great Live food!"	Comfort Food, e.g., plate lunch as a reminder of "the good old days" Fast Food, e.g., "Fast food take on Thai" and "Fast food pizza"	"I've been coming here since I was a little kid and it's always been my go-to place for comfort food."
6. Ingredient - including Meat (type, part, and color of meat), fruit and vegetable, and Condiment	Not too oily/greasy, light Not too salty Not too sweet Organic, Natural, Non GMO, Gluten-free, Dairy-free, Vegan, Tofu, Alfalfa, Vegetable, Fruit, (extra virgin) olive oil, Canola oil, Fat free mayonnaise, local ingredient, raw ingredient Containing fruit or vegetable Compensation for the lack of meat by playing up spices and textures. White meat Breast Fake meat Grass-fed beef	"It wasn't too salty, lots of vegetables mixed in. I liked it. :)" "I know this café uses quality, fresh ingredients so I think the acai bowl really reflects that." "I wanted something fruity and fresh and I was able to get that." "If you're vegan or vegetarian, their selection of faux meats is really amazing…" "…the smoothies actually had a good amount of fruit…"	Too much fat: greasy, creamy, rich, buttery, cheesy, greasy, fatty, oily, oil puddle on my plate Too much salt: too salty Too much sugar: too sweet, sugary, a heap of powdered sugar MSG (Monosodium Glutamate) Ingredients that turned bad Food coloring Harmful chemicals Gravy Red meat Thigh	"Their Thai tea with milk is wayyyyyyy too sweet…" "A very rich and sugar sprinkled baked goody…" "There was lots of gravy slathered over the bed of rice…"
Category	**Ones that signify healthy**	**Example**	**Ones that signify**	**Example**

	food choices		unhealthy food choices	
7. Cooking Method/Style	Steamed, Homemade, Not being processed by heat (raw food and live food), freshly made, freshly baked	"The steamed fish was better than expected and cooked very nicely."	Fried, Deep-fried, Refried, Reheated, Microwaved, Premade, Pre-frozen, Pre-refrigerated, under-cooked	"…the pata was most likely leftovers that were refried again which is why we needed the lobo knives."
8. Freshness (of the ingredients and of how the food is being made)	Fresh ingredients	"The 7 layer salad—super fresh and comes with guacamole—I would recommend it!"	Leftovers Ingredients that are stale, old, and rotten	"The baby corn tasted sour, almost rotten."
9. Option	Variety of healthy menus "Brown rice" option is much appreciated. A healthy plate option	"The brown rice isn't just regular brown rice. It seemed like it was the multi grain kind of brown rice.. It had a better texture to it which I loved." "I chose brown." "Plenty of vegan options, as well as vegetarian."	Limited option of choices such as portion/size and ingredient	"I was slightly disappointed that they only had once size because I get filled pretty quickly so I like to order small sizes." "No gluten-free options"
10. Hygiene	Cleanliness (dirty, gross, hairs or bugs in food) and condition of restaurant (clean and bright) Pollution (eating near the parking lot). Generally, Hygiene is mentioned more frequently in reviews of restaurants resulting from the search term "unhealthy food."			
Category	**Ones that signify healthy food choices**	**Example**	**Ones that signify unhealthy food choices**	**Example**

| 11. One's relationship with food, Lifestyle, culture, and Eating Behavior | Vegetarian, Vegan, Trying to eat less meat, On a diet, Control of food intake, Set a good example for children, On a diet, Healthy eating kick, craving of healthy food (for its taste or health benefits), bodybuilder style of ordering (no oil and extra lean meat), and being pregnant. | "…I had to limit my sugar intake during the pregnancy." "I'm dying to try one of their salads next time, as they sound very 'fresh' and healthy." "I was craving 'healthy food'…wait, no that's not right, scratch what I just said. The truth is that I was hungry and my pants were getting tight." "…last week after the gym I was starving but wanted something light…" "My husband and I agreed that we needed to start making healthier food choices to set a good example for our baby son." | Carnivore, Rasited to eat meat, Indulgence/Binge, Last meal, Addiction, Will exercise to burn calories eaten (on the contrary, some mentioned that having unhealthy food is the reward after exercising), Sweet tooth, Nostalgia, Unhealthy Filipino food norm, cravings, Eating well, Overorders, No tomorrow | "Who ever invented spam musubi is a genius! I think I'm addicted to that." "I HATE bell peppers!" "My mom always overorders and can pack away the food like no tomorrow." "I love a good steak and truly believe that bacon and butter make everything better." "WHEN IS THERE NO TIME FOR A COOKIE?" |
| **Category** | **Ones that signify healthy food choices** | **Example** | **Ones that signify unhealthy food choices** | **Example** |

12. Association with body, weight, wellbeing/sickness, and health state	Good for body/health	"Long story short: Eat here! Your body will thank you. :)" "…it satisfies my body and health." "I've lost a lot of weight…" "Perfect food for people who are health conscious and/or who has food allergies."	Obesity, Diabetic, Heart attack, Gout, Weigh 200 pounds, Mentioning of waistline, Blood sugar level	"And now, a couple hours later, my stomach is churning and extremely uncomfortable." "So yeah you're eating the loco moco, then the waffles come out and yeah… you're just heart attack heaven :)"
13. Feeling	Regaining vitality Feel healthy Feeling less guilt	"My vitality began to return! I felt energized and satiated." "…I feel so great." "…makes me happy."	A gross feeling of fullness Regret	"What a waste of carbs."

CONCLUSION

Health-related cues to action derived from Yelp restaurant reviews appear to be able to be meaningfully categorized. These categories are neither hierarchical nor independent since they tend to connect and overlap, e.g., type of food (comfort food) and one's relationship with food (nostalgia). They revealed interesting themes of relationship between food choices and health.

Our findings suggest that health-related cues to action and the power of online consumer reviews may have noticeable effects on health behavior, particularly on food choice. Health-related cues to action, as part of e-word-of-mouth, may be a useful starting point in creating personalized messages to individuals to encourage them toward making healthier food choices. Yelp seems to be a social network site that contains valuable insights and—most importantly in this study—a potential key to a healthier eating. People in Hawaii are generally perceived to be laid-back; however, a large number of review contributors do appear to think about health when dining out. This study contributes to the Health Belief Model in the era of computer-mediated communication by focusing on the under-researched cues to action. We demonstrate that cues to action can be found on user-generated content platforms in the form of restaurant reviews. Health-related cues to action revealed in this study could be thought of as barriers and facilitators of healthy eating, depending on the degree of health consciousness present in the information receiver or a Yelp review reader (Danath, 2011; Flanagin & Metzger, 2013).

Social media, like Yelp, can be a repository of information that reveals useful insights and trends for researchers and policy makers who wish to understand how consumers make food choices in our ever-changing society so that effective intervention might be devised. Hawaii's unique food scene is filled with multicultural cuisines. Interestingly, Yelpers reveal much more beyond food review. Their slices of life, beliefs, fears, hopes, and dreams are waiting—among intense discussions about the meal they have—to be discovered.

LIMITATIONS AND FUTURE RESEARCH

There are some limitations in this study and its methodology. First, it is not clear how Yelp's search function organize "healthy food" and "unhealthy food" since a few restaurants came up with both searches. It might do so by simply searching for words from reviews and/or considering how restaurants position themselves. However, analyzing the reviews through the current search bar is still useful; the restaurants somehow represent Yelp's "healthy" and "unhealthy" end of the continuum to some extent. This can be improved by having a better understanding of Yelp's information retrieval system and also relying on other resources to identify "healthy" and "unhealthy" food (or restaurants).

Second, the textual coding was done manually. Words, phrases, and sentences in Yelp are context sensitive. There are cases of double negation and contemplating about other restaurant, memory, type of food, and eating style while writing a review for a particular restaurant. For example, "I miss the days when you were a single shop operating out of a garage. I miss the rich, creamy curries with the large slices of chicken breast with tons of veggies." In the future, automated system that is able to deal with more context sensitivity will be needed for larger samples. This intricate process means that textual analysis software might not be the most efficient tool for this kind of study.

Last, information receivers' ability to judge cues to action is varied. It should be studied in future work.

There are many possibilities for future research. Other types of restaurants—such as luxurious restaurants and fast food restaurants—might reveal different cues to action and insights. Quantitative content analysis, with software to analyze key words and phrases (not sentences or paragraphs), might reveal what lead people to make unhealthy food choices. Moreover, factors that people take into consideration when trying to make healthy food choices can be investigated. Our study did not account for an information receivers' ability to judge cues to action. Results of future research will logically support recommendations to Yelp executives for creating useful filter systems for people with particular needs, e.g., vegetarians, persons who are allergic to particular type of ingredient, consumers who want to have healthy food at a reasonable price, and people who are prone to diabetes.

References

10 Things you should know about Yelp. Retrieved from http://www.yelp.com/about

Bandura, A. (1997). Self-efficacy: The exercise of control. New York: W.H. Freeman.

boyd, d. (2008) *Taken out of context: American teen sociality in networked publics*. Doctoral thesis, University of California, Berkeley, CA.

Brennan, R., Dahl, S., & Eagle, L. (2010). Persuading young consumers to make healthy nutritional decisions. *Journal of Marketing Management, 26*(7-8), 635-655.

Burnkrant, R. E., & Cousineau, A. (1975). Informational and normative social influence in buyer behavior. *Journal of Consumer Research, 2*(3), 206-215.

Centers for Disease Control and Prevention (2013). Behavioral risk factor surveillance system 2012. Retrieved from http://www.cdc.gov/obesity/data/adult.html

Centers for Disease Control and Prevention's National Center for Chronic Disease and Health Promotion, Division of Nutrition, Physical Activity, and Obesity (2013). State indicator report on fruits and vegetables 2013. Retrieved from http://www.cdc.gov/nutrition/downloads/State-Indicator-Report-Fruits-Vegetables-2013.pdf

Chahuneau, V., Gimpel, K., Routledge, B. R., Scherlis, L., & Smith, N. A. (2012, July). Word salad: Relating food prices and descriptions. In *Proceedings of the 2012 Joint Conference on Empirical Methods in Natural Language Processing and Computational Natural Language Learning* (pp. 1357-1367). Association for Computational Linguistics.

Champion, V. L., & Skinner, C. S. (2008). The health belief model. In K. Glanz, B. K. Rimer, & K. Viswanath (Eds.), Health behavior and health education: Theory, research, and practice (4th ed., pp. 45-65). USA: Jossey-Bass.

Donath, J. (2006). Signals, cues and meaning. Manuscript in preparation.

Donath, J. (2007). Signals in social supernets. *Journal of Computer-Mediated Communication, 13*(1). Retrieved from http://jcmc.indiana.edu/vol13/issue1/donath.html

Doanth, J. (2011, October). *Signals, truth, and design*. Manuscript available: http://smg.media.mit.edu/people/judith/signalsTruthDesign.html

Flanagin, A. J., Metzger, M. J. (2013). Trusting expert- versus user-generated online: The role of information volume, valence, and consumer characteristics. *Computers in Human Behavior, 29*, 1626-1634.

Girard, T., Silverblatt, R., & Korgaonkar, P. (2002). Influence of product class on preference for shopping on the Internet. *Journal of Computer-Mediated Communication, 8*(2). doi: 10.1111/j.1083-6101.2002.tb00162.x

Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory: Strategies for qualitative research*. USA: Sociology Press.

Goh, K. Y., Heng, C. S., & Lin, Z. (2013). Social media brand community and consumer behavior: Quantifying the relative impact of user-and marketer-generated content. *Information Systems Research*, *24*(1), 88-107.

Hayden, J. A., & Paterson, W. (2009). *Introduction to health behavior theory*. USA: Jones and Bartlett Publishers. Retrieved from http://www.jblearning.com/samples/0763743836/chapter%204.pdf

Henri, F. (1991). Computer conferencing and content analysis. In A. Kaye (Ed.). *Collaborative learning through computer conferencing: The Najaden papers*, (pp. 117-136). London: Springer-Verlag.

Hsieh-Fang, H., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research, 15*(9), 1277-1288. doi:10.1177/1049732305276687

Kondracki, N. L., Wellman, N. S., & Amundson, D. R. 2002. Content analysis: review of methods and their applications in nutrition education. *Journal Of Nutrition Education & Behavior 34*(4), 224-230.

Klein, L. R. (1998). Evaluating the potential of interactive media through a new lens: Search versus experience goods. *Journal Of Business Research, 41*(3), 195-203.

Kuehn, K. M. (2013). "There's got to be a review democracy": Communicative capitalism, neoliberal citizenship and the politics of participation on the consumer evaluation website Yelp.com. *International Journal of Communication, 7*, 607-625. Retrieved from http://ijoc.org/ojs/index.php/ijoc/article/view/1728

Lewis, J., & West, A. (2009). 'Friending': London-based undergraduates' experience of Facebook. *New Media & Society, 11*(7), 1209-1229.

Lu, X., Ba, S., Huang, L., & Feng, Y. (2013). Promotional marketing or word-of-mouth? Evidence from online restaurant reviews. *Information Systems Research, 24*(3), 596-612.

Luca, M. (2011). Reviews, reputation, and revenue: The case of Yelp.com. Working paper, Harvard Business School, Boston, USA.

Luca, M., & Zervas, G. (2013). Fake it til you make it: Reputation, competition, and Yelp review fraud. Working paper.

Marwick, A. E., & boyd, d. (2011). I tweet honestly, I tweet passionately: Twitter users, context collapse, and the imagined audience. *New Media & Society, 13*(1), 114-133.

Metzger, M. J., Flanagin, A. J., & Medders, R. B. (2010). Social and heuristic approaches to credibility evaluation online. *Journal of Communication, 60*(3), 413-439. doi:10.1111/j.1460-2466.2010.01488.x

Minichiello, V., Aroni, R., Timewell, E., & Alexander, L. (1990). *In-depth interviewing: Researching people*. Hong Kong: Longman Cheshire.

Miura, M., & Shimabukuro, B. (2007). *What Hawaii likes to eat*. Hawaii: Mutual Publishing Company.

Nabi, R. L., Prestin, A., & So, J. (2013). Facebook friends with (health) benefits? Exploring social network site use and perceptions of social support, stress, and well-being. *Cyberpsychology, Behavior & Social Networking*, *16*(10), 721-727. doi:10.1089/cyber.2012.0521

Nelson, P. (1970). Information and Consumer Behavior. *The Journal of Political Economy, 78*, 311–329.

Owens, T. (2012). Tripadvisor rates Einstein: using the social web to unpack the public meanings of a cultural heritage site. *International Journal Of Web Based Communities, 8(*1), 40-56.

Pan, Y., & Zhang, J. Q. (2011). Born unequal: A study of the helpfulness of user-generated product reviews. Journal Of Retailing, 87(4), 598-612. doi:10.1016/j.jretai.2011.05.002

Park, D. H., & Kim, S. (2008). The effects of consumer knowledge on message processing of electronic word-of-mouth via online consumer reviews. *Electronic Commerce Research and Applications, 7*, 399-410.

Salazar, L.F., Crosby, R. A., & DiClemente, R. J. (2006). Qualitative research strategies and methods for health promotion. In R. A. Crosby, R. J. DiClemente, & L. F. Salazar (Eds.), *Research methods in health promotion* (150-198). USA: Jossey-Bass.

Shepherd, J., Harden, A., Rees, R., Brunton, G., Garcia, J., Oliver, S., & Oakley, A. (2006). Young people and healthy eating: A systematic review of research on barriers and facilitators. *Health Education Research, 21*(2), 239-257.

Todd, J. E., Mancino, L., & Lin, B.-H. (2010). The impact of food away from home on adult diet quality. *Economic Research Report Number 90*. Washington, DC: Economic Research Service/U.S. Department of Agriculture.

United States Department of Agriculture Center for Nutrition Policy and Promotion (2013). Foods and nutrients to increase. In Dietary guidelines for Americans, 2010 (4). Retrieved from http://www.cnpp.usda.gov/publications/dietaryguidelines/2010/policydoc/chapter4.pdf

Utz, S., Kerkhof, P., & van den Bos, J. (2012). Consumers rule: How consumer reviews influence perceived trustworthiness of online stores. *Electronic Commerce Research & Applications, 11*(1), 49-58. doi:10.1016/j.elerap.2011.07.010

Vance, K., Howe, W., & Dellavalle, R. P. (2009). Social Internet sites as a source of public health information. *Dermatologic Clinics, 27*(2), 133-136.

Walther, J. B., & Parks, M. R. (2002). Cues filtered out, cues filtered in: Computer-mediated communication and relationships. In M. L. Knapp & J. A. Daly (Eds.), Handbook of interpersonal communication (3rd ed., pp. 529–563). Thousand Oaks, CA: Sage.

Weber, R. P. (1990). *Basic Content Analysis*. Newbury Park, CA: Sage Publications.

West, A., Lewis, J., & Currie, P. (2009). Students' Facebook 'friends': Public and private spheres. *Journal of Youth Studies, 12*(6), 615-627.

West, A., Lewis, J., & Currie, P. (2009). Students' Facebook 'friends': Public and private spheres. *Journal of Youth Studies, 12*(6), 615-627.

Willemsen, L. M., Neijens, P. C., & Bronner, F. (2012). The ironic effect of source identification on the perceived credibility of online product reviewers. *Journal Of Computer-Mediated Communication, 18*(1), 16-31. doi:10.1111/j.1083-6101.2012.01598.x

Willemsen, L. M., Neijens, P.C., Bronner, F., & de Ridder, J. A. (2011). "Highly recommended!" The content characteristics and perceived usefulness of online consumer reviews. *Journal of Computer-Mediated Communication, 17*, 19–38. doi: 10.1111/j.1083-6101.2011.01551.x

Yano, C. (2006). Shifting plates: Okazuya in Hawai'i. *Amerasia Journal, 32*(2), 37-45.

Zhang, Y., & Wildemuth, B. M. (2009). Qualitative analysis of content. In B. Wildemuth (Ed.), *Applications of social research methods to questions in information and library science* (pp.308-319). USA: Libraries Unlimited.

Zhang, Z., Ye, Q., Law, R., & Li, Y. (2010). The impact of e-word-of-mouth on the online popularity of restaurants: A comparison of consumer reviews and editor reviews. *International Journal Of Hospitality Management, 29*(4), 694-700. doi:10.1016/j.ijhm.2010.02.002

Appendix A: Health-Related Cues to Action Data Collection Instrument

Name of establishment				
Date of review				
Search result of Yelp		Healthy food		Unhealthy food

Health-related cues to action are being examined from statements that describe food experiences on Yelp. The food reviews displayed may instigate action for healthy or unhealthy food choices when dining out. The coders shall examine health-related cues to action for 20 most recent reviews or until data saturation have been reached.

Including:

- A word or phrase that the reviewer describes as a healthy eating experience. These may include adjectives describing healthy food, such as "fresh" or "light". Cues do not necessarily have to discuss the traditional healthy diet, but can also be vegetarian, non-GMO, grass-fed beef, or any other experience that the reviewer perceives as healthy. This could be a positive or negative experience.
  - Example: "The tostadas are more like...healthy nachos. With no melted cheese. :("
  - Example: "The produce...most of it looks vibrant and yummy! Some look very very sad. But that is organic produce, it doesn't have all the poisonous chemicals to make and keep them pretty."
- A word or phrase that the reviewer describes as an unhealthy eating experience. Cues do not necessarily have to follow a traditional unhealthy diet; they can include any phrase the reviewer perceives as unhealthy. These may include adjectives describing unhealthy foods, such as "cheesy", "greasy", "fried", or "salty". This could be a positive or negative experience.
  - Example: "Definitely the place to go when you want a good dose of Filipino diabetic-heart attack-gout food...Yum!"

Excluding:

- Phrases that describe parking or customer service experiences.
  - Example: "Definitely quick and convenient. As soon as I order I wait no longer than a minute and my food is ready!"
- Phrases that describe positive or negative food experiences and do not include any health-related connotation.
  - Example: "Again, the spicy ahi portion of the meal was, as other reviewers have said, more like pâté - which isn't a bad thing, however I prefer a chunkier spicy ahi."

o Example: "Fried chicken, fried shrimp, fried, fried, fried."	

Mentioning health-related cues to action:

Phrases that should not be included:

Copy and paste reviews into the boxes below. All words, phrases, sentences, or paragraph that represent a concept should be highlighted as health-related cues to action.

Review #1
Review #2
Review #3
Review 4
Review 5
Review 6
Review 7
Review 7
Review 8
Review 9
Review 10
Review 11
Review 12
Review 13
Review 14
Review 15
Review 16
Review 17

Review 18	
Review 19	
Review 20	