Designing Restaurant Digital Menus to Enhance User Experience

Yun Wang
Iowa State University

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Designing restaurant digital menus to enhance user experience

by

Yun Wang

A thesis submitted to the graduate faculty
in partial fulfillment of the requirements for the degree of

MASTER OF FINE ARTS

Major: Graphic Design

Program of Study Committee:
Roger E. Baer, Major Professor
Sunghyun R. Kang
Lee W. Cagley

Iowa State University
Ames, Iowa

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CHAPTER 1. OVERVIEW

1.1 Introduction

1.1.1 Statement of Problem

Menu is a primary marketing and communication tool in the restaurants industry. Business-to-consumer digital devices are widely used in both daily life and business, especially the hospitality industry. Menus have a history of 260 years and now more restaurants are revising menus and starting to use digital menus. Marketing research and reports from Nation’s Restaurant and New York Times show that digital menu helps restaurants to increase profit by making food more accessible, selling more and requiring less labor in comparison to the traditional printed paper menu. The design principles and user interface are different in print menu and digital menus and we need design guidelines for new generation of digital menus. Digital menus also offer great opportunities of customization and personalization for using interaction to enhance user experience.

There is little research that has been done in the graphic design and human computer interaction field for digital menu design. It seems that digital menus create a more effective and flexible way of reading and ordering while at the same time people have different experiences and expectations for using digital menus with interaction, not to mention personalization and customization will create better user experience. Currently no specific research shows how typography, orientation, layout and columns work for digital menus;
what the efficient ways of arranging all the elements in digital menus are, and how images, graphic elements and descriptions would help to communicate with viewers.

1.1.2 The Purpose of the Study

The purpose of this study is to build an evaluation matrix for existing print and digital restaurant menus, and produce some fundamental guidelines for structure, organization, and design layout and interaction features of restaurant digital menu design. The evaluation and design guidelines will be developed using principles from design, human computer interaction and the hospitality industry. The study will create a prototype design as a solution of digital menu systems of Applebee’s as well.

1.1.3 The Proposed Method

Literature review will look at menu design and user interface principles and color theories from design, human computer interaction, psychology and the hospitality industry. The methodology in this research includes development of an evaluation matrix and case studies. Design guidelines and evaluation matrix will be built based on literature review. Case studies will exam traditional print menu design and digital menu design systems from four popular casual dining restaurants in the United States in hospitality industry using the evaluation matrix. Prototype and design will also be evaluated by the evaluation matrix.
1.1.4 Significance

According to Radice (1992) and Kershaw’s (2009) research, the menu is considered as a primary marketing and sales tool by directing attention and increasing profit in restaurants. Surveys and reports from *The New York Times* and *Nation’s Restaurant News* show that although there is a huge demand of menu design from the hospitality industry, most menu designers and restaurants operators found it very difficult to access related resource and research. Moreover, when it comes the new generation of digital menus, they have to design use their instinct and own experience. The study of menu transferring from print to digital display will provide fundamental design guidelines, which will benefit both marketing and academic research field. Restaurants operators and menu designers can use the evaluation matrix as design guidelines to update menus, and researchers can evaluate and redesign existing menus using the evaluation matrix and conduct further research based on the findings and result from this research.

1.1.5 Organization of the Study

This study includes introduction, literature review of research and studies including print and digital typography, human computer interaction, iPad usability, design principles, illustration and photography as visual messages and psychology. The thesis will also create design guidelines, evaluation matrix and design prototype. Conclusion and discussion, recommendation and future work will be at the end of this study.
CHAPTER 2. LITERATURE REVIEW

2.1 Menus and Restaurants

2.1.1 Definition of Menu

According to Webster’s Dictionary, the definition of the word menu is “a list of
dishes that may be ordered (as in a restaurant) or that are to be served (as at a banquet)”
(Merriam-Webster’s, 2009). Jim Heimann, Steven Heller and John Mariani explained the
term in their book, Menu Design in America as “the word itself finds its way to French from
the Latin minutus, something diminished or made small, as in minuta, and ultimately minute.
In France, it was used to signify a list or resume,” and “is a resume of an establishment’s
offerings.” (Heimann, Heller and Mariani, 2011). In short, it is a literal French translation of
the word, as Leonard Fellman stated, “a small detailed list of the foods available to
patrons” (Fellman, 1981).

2.1.2 The Purpose of a Menu

The purpose of a menu is to communicate (Radice, 1985). The menu is an important
marketing tool to guide customers and influence their selection (Kershaw, 2009). It is “part
of the complete dining experience” and should “maximize customer satisfaction” (Radice,
1992). A menu is also “a major player in a restaurant’s personality” and “a portrayal of the
restaurant’s character” (Radice, 1992). Therefore, menus are considered the “Silent
salesperson” (Pavesic, 2005). Heimann, Heller and Mariani believed that a menu is “beyond a mere element of a restaurant to a marketing tool, a branding opportunity, and an indicator of cuisine, a barometer of taste, and a highly sought piece of ephemera” (Heimann, Heller and Mariani, 2011).

A menu is a map “that encourages easy navigation between hunger and satisfaction” guiding guests through “the restaurants’ profitable and distinctive menu items so that the guest will have an opportunity to at least consider them”. Dr. Ronald Cichy and Philip Hickey Jr. insist that the menus’ effect on profitability depends to a great degree on the design (Cichy and Hickey, 2005).

2.1.3 History of Menu

The first generation of a restaurant menu appeared in China during the Song Dynasty, which was one millennium ago between the 10th and the 13th century (Gernet, 1962, Heimann, Heller and Mariani’s, 2011). Those menus served similar functions to the modern menu, such as allowing diners to “choose one from column A, one from column B”; however, most scholars don’t consider them as official menus (Heimann, Heller and Mariani’s, 2011).

Modern menus are from the latter half of the 18th century in Western Europe (Heimann, Heller and Mariani, 2011). The first menu was credited to Frenchman Pierre Boulanger, who placed a large poster at the front door of his cafe in 1765 with the special of the day, as well as the name of the chef, festoons and decoration (Fellman, 1981). In Paris, people also call a menu “a carte (which also refers to a map)” or the “bill of fare”, because
menus were the “graphic manifestation of the fare” (Heimann, Heller and Mariani, 2011). Menus were also written on strips of cloth to gain extra gratuities. In the Russian method, a major domo would yell out the menu in a loud voice and when each course was served, he would bellow its name plus his comments (Fellman, 1981). At the end of 18th century, some sophisticated restaurants began to use both French and English on menus to claim an international or European cuisine (Fellman, 1981).

Restaurants started to develop menu arts in the 1800s, and famous French artists including Toulouse-Lautrec, Renoir, and Gauguin were hired to decorate menus with portraits and illustrations, especially for menu covers (Fellman, 1981, Scanlon, 1999). Most covers were in full color, with many of them embellished with embossing and engraving. Not every restaurant could afford to hire artists, so the most common and least expensive method to produce a menu was to maintain a library of illustrations, proverbs and statements having to do with foods (Fellman, 1981).

Menu design changed with the influence of moveable type and the printing press during the 19th century (Spang, 2000; Heimann, Heller and Mariani’s, 2011). Before the print-technology revolutions of the 1830s and the 1880s, menus were “handwritten without much thought for appearance”, due to the prohibitive cost of printing (Scanlon, 1999). During the Industrial Revolution, new technology changed printing dramatically, including typography and graphic arts, and designers began exploring more with forms and images (Carter, Day and Meggs, 2007). Menus in the 19th century were designed as “a single large page with columns of closely packed type” like “the newspapers of the Consulate and the First Empire” (Scanlon, 1999; Spang, 2000). The pages were put into “a leather-covered booklet held together with a silken cord in midcentury”, which were “expensive and fragile”
(Spang, 2000, Heimann, Heller and Mariani, 2011). Therefore, menus had “a single-sheet design with copious illustration and graphic ornamentation”. Later in the middle of the 19th century, menus looked like realist novels, or resembled the poster art of Belle Époque (Heimann, Heller and Mariani, 2011). In the early 1900s, more and more restaurants provided menus for each individual guest (Scanlon, 1999). During this period, menus were heavily influenced by newspaper design in terms of size, typefaces and layouts (Spang, 2000, Kershaw, 2009).

2.1.3.1 History of Menus in America

Colonial Americans did not dine in restaurants. Although the term restaurant appeared in France during the 1760s, it did not travel to the United States until the 19th century (Miller and Pavesic, 1996). No specific date has been claimed for the first appearance of American menus; their designs inherited a European tradition (Figure 1). Due to “relatively cheap and accessible printing, typography, and engraving techniques”, modern menus in the United States developed their own style during the later 19th and early 20th centuries, with enjoyable, fashionable and memorable graphics to gain a beneficial effect (Heimann, Heller and Mariani’s, 2011).

Before the Great Depression, illustrated menus were commonly used in both high end and casual restaurants (Figure 2). The graphic style of the day was art modern or art deco, and variations on their signature graphic and typographic motifs prevailed (often provided by printers who had different stock-cover artworks available to their customers). Shared conceits were developed in menu design (Heimann, Heller and Mariani 2011).
Figure 1 An 1899 menu from Delmonico's restaurant in New York City, April 18, 1899

Figure 2. A prix fixe menu from Lotos Club, New York City, March 4, 1893
During World War 2, menus promoted the selling of U.S. war bonds by patriotic graphics. Graphic conventions for menu illustration were often dictated by the unscientific whatever-works principles (Heimann, Heller and Mariani 2011).

2.1.4 Taxonomy of Restaurants

Based on the systems approach, market segments divided restaurants into the following categories: full service restaurants, fast food restaurants, elementary and secondary schools, employee feeding, hospitals, hotels and universities, colleges and universities, military, recreation facilities, convenience and grocery stores, nursing homes, transportation, retail stores and other food services (Baraban and Durocher, 1988).

Cichy and Hickey categorized restaurants by the types of service they offer: Quick-service (McDonald’s, KFC, Taco Bell, Arby’s), quick-casual (Chipotle, Panera Bread, Subway), family-dining (Bob Evans, Cracker Barrel, Sweet Tomatoes), casual-dining (Applebee’s, Chili’s, LongHorn Steakhouse, Olive Garden, T.G.I. Friday’s), and fine-dining (The Capital Grille, Morton’s) (Cichy and Hickey, 2005).

2.1.3 Taxonomy of Customers

Menu engineer and consultant Gregg Rapp classified diners into four categories: entree, recipe, barbecue and dessert. According to Rapp, entree diners only want basic information about what the dish is and how much it is, with no detailed descriptions needed. Recipe diners ask questions about ingredients and want to know as much as possible.
Barbecue diners like to share food and chat with servers with nametags. Dessert diners are people who order trendy things (Kershaw, 2009).

2.1.3.1 Characteristics of Selected Markets

In the United States, customers can be divided into three major markets that consider differences in age (Cichy and Hickey, 2005).

- **Baby-boomers**

  Baby-boomers are people who were born from 1946 to 1964 and they are about one third of the United States population. Most baby-boomers live “busy lifestyles”, work as professionals or managers, and have dual-career families. Compared to customers from other age groups, baby-boomers “respond well to target marketing”, and they are “easier to accommodate and satisfy.” They prefer moderately priced restaurants rather than quick-service restaurants.

- **Generation X**

  Generation X is the age group of people who were born between 1965 and 1981, and they tend to put families first when compared to the baby-boomers generation. As consumers, they are smart and value-conscious, and they like products that match their “immediacy, independence, and innovation”. Generation X researches their options carefully before making a purchase. They respond to restaurants with concepts that promote excitement, entertainment, and family/group interaction actively.

- **Generation Y**
Generation Y designates the age bracket of people born during the nineteen seventies/ early eighties to the mid-nineteen nineties. Their population is about three times larger than Generation X and they dominate the marketplace as the baby-boomers have done. They are also referred as the “Millennium Generation”, “the Echo Boomers” or “Generation Net” because they grew up with the Internet and personal computers. Unlike baby boomers, Generation Y has little brand loyalty. They do not respond to traditional advertising methods, preferring grass-root marketing, sponsorship of extreme-sporting events, and the Internet.

### 2.1.3.2 Special Guests

According to Cichy and Hickey’s research, there are different kinds of guests that require special attention (Cichy and Hickey, 2005).

- **Guests with special diet needs**

  Menus should provide items that are low-calorie, with no sodium and items for vegetarians and people with food allergies.

- **Senior citizens**

  Some elderly diners prefer a light meal, and they tend to eat more slowly. Menus should provide soft and bland food, instead of chewy and spicy food.

- **International guests**

  Pictures of food would help diners read menus that do not speak English.

- **Guests with disabilities**
Reading the menu to diners with visual impairments would help them order, and paper and pens would help diners with hearing impairments.

2.1.4 Taxonomy of Menus

Foodservice Management Professional Jack Miller and Dr. David Pavesic mention in their book *Menu Pricing and Strategy* that customers will react first to the physical design format of the menu, such as the cover and the shape and paper quality. They will interpret the messages that the menu is trying to deliver by these physical facts (Miller and Paversic, 1996). There are several common menu formats (Figure 3, 4) (Miller and Paversic, 1996).

- **Single-page format**
  
The entire menu is on a single page or card. The concentration area for sales is on the top half of the page.

- **Two-page/ Single-fold menus**
  
The most common format of menu, where the size and shape may vary considerably.

- **Panel**
  
  A single, unfolded section. A two-panel menu has the format of a book with a front and back cover while a tri-panel format resembles a page folded into thirds.

  Menu designs vary in shape (rectangular, circular, or triangular) and size. According to The National Restaurant Association, the most common size for a menu is 9 inches by 12 inches; however, menus can vary in size from small (4x6 inch) to large (13x18 inch) or larger (Pavesic, 2005).
Figure 3. Menu Formats
Figure 4. Menu Design Layouts
2.1.5 Anatomy of Menus

The traditional meal periods include breakfast, lunch and dinner (Figure 5) (Cichy and Hickey, 2005).

- **Breakfast**

  Breakfast is considered the most profitable meal period because of its relatively low food costs, such as pancakes and eggs. Some food service operators found that customers order healthy food items during weekdays, but choose traditional breakfast items on the weekends. Cichy and Hickey list both traditional and healthy alternative food items in *Managing Service in Food and Beverage Operations*. Traditional breakfast items include eggs, pancakes, and breakfast meats while healthier menu items include multigrain cereals, oatmeal with fresh fruit, and breakfast sausage links made from chicken and apples (Cichy and Hickey, 2005). Albin Seaberg has similar classifications in his book *Menu Design: Merchandising and Marketing*. (Seaberg, 1991)

- **Lunch**

  Lunch often has more complex items than breakfast and its service speed is very crucial compared to other meals due to working customers on their lunch break. Restaurants tend to have more balanced menu with both healthy, fresh and traditional food items. Traditional lunch menu items include variations of hamburgers, soups, salads, steak sandwiches, and fried chicken while healthier alternatives include grilled fish, turkey burgers, garden vegetable burgers, pasta, grilled boneless chicken breasts, and a variety of salads (Cichy and Hickey, 2005).
• Dinner

Dinner is usually considered as the most important, as well as the most expensive meal of the day. People dine out for all sorts of reasons. Variety and healthy choices are getting more and more important for the dinner menu. Traditional dinner menu items include steak, soup, fish and seafood, pasta, Caesar salad, veal, and chicken entrees, while healthier alternatives are entrees prepared by broiling, entrée salads with reduced-fat dressings, steamed fresh vegetables, and fresh fruits for dessert as well as low-carb items (Cichy and Hickey, 2005).

![LUNCHEON MENU FORMAT](image)

![DINNER MENU FORMAT](image)

Figure 5. Simplified lunch and dinner format

2.1.6 Communicating via the menu

Seaberg’s most common menu categories include appetizers, soups, salads, sandwiches, entrees, side orders, desserts, children’s menu, and breakfast items. Typical specials include seasonal specials, “for two” combinations, ethnic specials, and Sunday or special occasion buffets (Seaberg, 1991).

Menus communicate to customers. Customers receive and interpret its message and form an attitude based on the menu’s concept. Symbols and words are decoded and translated
developing an expectation and a perceived value. Customers understand and accept this interpretation by their act of purchasing desired items. If their experience matches their expectation, customers will frequent the same restaurant again, which will help the restaurant be a profitable operation (Miller and Pavesic, 1996).

2.1.7 Terminologies in Menus

Headings are “titles of the courses or names of food categories that divide the menu into sections, such as appetizer, side dishes, seafood, beverages.” Menu items are “the individual dishes within each course or category, such as prime rib of beef or tice jambalaya.” Copy is “used for either descriptive or marketing purposes. Descriptive copy is the written description of each menu item, while merchandising copy sells other features of the restaurant, such as historical information, special events, or catering and private party facilities.” People don't read menus word by word. Instead, they scan the information. There are two controversial research findings about how people read print menus in restaurants. Traditionally, the most commonly used "scanpaths" is from graphic designer William Doerfler and in his influential "focal map" of menu reading. He suggests that a reader's eyes “zigzag across menu pages and focus for the longest period of time on the right-hand sweet spot” (Seaberg, 1991).

2.1.8 Scan Path and Sweet Spot

Though the original reference of 'sweet spot' has not been found, it has been traced to repeated references in academic work and trade press (Figure 6). In Doerfler’s 1978 report
(Figure 7), he stated that there is a “Sweet Spot” and people are instinctively drawn to the upper-right corner while reading a two-panel menu (Figure 8, 9 and 10). On the other hand, Gallup and Yang stated that people read two fold menus like reading a book, starting from the upper left corner of the left page and moving to the right page. They also pointed out that traditional “Sweet Spots” may not exist, and there is a “Soul Spot” on menus—where salads are located (Yang, 2012).

Figure 6. Scan path on different menus
Figure 7. Doerfler’s Menu Scan Path

Figure 8. Gallup and Yang’s Menu Scan Path
Figure 9. Doerfler’s Sweet Spot

Figure 10. Gallup and Yang’s Menu Scan Path 2
Figure 11. Menu Dimensions and Cover Size
2.1.9 Casual Dining

According to the Loomis report, sales at casual dining restaurant chains reduced in recent years due to the American economic recession. The situation got even worse when there was a severe winter. Restaurants started to focus on younger generations because the sales from the baby boomer generation decreased (The Loomis Agency, 2011).

In order to create a better consumer experience and enhance brand loyalty, casual-dining restaurants make efforts to use new technology systems, focusing on the sale of beverages, offering new and healthier menu options, as well as more gaming and leisure features.

Studies showed that although quality and convenience are always highly rated by all consumers, exploration and entertainment-type benefits are getting more and more important in casual dining and help to build brand loyalty (Jang and Mattila, 2005).

Restaurants are willing and eager to adopt new technologies for better management and benefits. Casual restaurants have begun to explore new meal-pacing systems and digital menus to manage costs and enhance the restaurant’s performance. More and more companies have started to consider social responsibilities and sustainability in mind. They are also using the nontraditional approach of social media, such as Facebook and Twitter (The Loomis Agency, 2011).
2.1.10 Reasons people eat out

According to Restaurants and Institutions magazine, the number one reason people ate out in the mid-1990s was that they didn't have time to prepare food at home (Figure 12) (FoodTrends '95).

![Pie chart showing reasons people eat out](image)

**Busy Lives Mean Busy Restaurants**
A lack of time to prepare food at home is the main reason people are eating out more these days, according to foodservice operators surveyed.

- Don't want to cook at home 18%
- No time to prepare food at home 47%
- Enjoy the atmosphere 13%
- Prefer freshly prepared meals 7%
- Special occasions and celebrations 5%
- Some other reason 6%
- Don't know how to cook 5%

**Figure 12. Reasons people eat out**

Two decades later, the 2010 NPD (National Purchase Diary) report listed the top eight reason families choose to eat out as don't have to clean up after eating, more of a treat/reward to eat out, someone else is doing the cooking, crave something from a restaurant over a home-cooked meal, being served by someone, can socialize/talk more at a restaurant, can’t
make restaurant food at home, and can have more courses at a restaurant (The NPD Group, 2010).

The report also pointed out that more and more restaurants are focusing on the reason that people consider eating out as a treat or reward, therefore these restaurants are trying to “create messaging, atmospheres and menu items that position the brand as an indulgence or a place for entertainment and relaxation,” as well as for “socialization” (The NPD Group, 2010).

2.1.11 Effects on peoples’ choices when eating out

A 2006 study conducted by the United States Department of Agriculture (USDA) stated that healthy food options and variety, taste, convenience, and entertainment value are the factors that will affect consumers’ choices when they eat out (Stewart, Blisard and Jolliffe, 2006).
2.2 Menu Design Terminologies

2.2.1 Time Limit

Instead of reading menus word for word, consumers scan them. The subconscious brain is overloaded with information when customers open a menu, and their eyes search for a point of stimulus (Main, 1995). Gallup reported that most customers spend less than two minutes scanning a menu, so the restaurant has a very minimal time limit to get their message across to customers (Panitz, 2000).

2.2.2 Pages

Most casual dining restaurants use multi-page menus and an extensive listing of menu items. Some menus have approximately ten pages, while others could have more than twenty. Studies have shown that 60-70% of sales will come from fewer than 18-24 menu items; too many choices will slow down order-taking time (Panitz, 2000).

2.2.3 Prices

Kimes and other researchers from Cornell University suggest that the price of items should never be highlighted and should always be placed at the end a menu description, without any dollar sign, especially for high-end restaurants. Research shows that customers spend less when dollar signs are used on menus (Kershaw, 2009).
2.2.4 Color

Colors are very important in communicating and conveying messages to audiences and can grab customers’ attention, making text and images more meaningful and memorable. (Eiseman, 2000) According to Eiseman, studies show that “color accelerates learning, retention, and recall by 55% to 78%; improves and increases comprehension by up to 73%; increases recognition by up to 87%; increases motivation and participation, moves people to action by up to 80%, reduces error count from 55% to 35%, and sells products and ideas more effectively by 50% to 85%” (Eiseman, 2000).

Colors can be used to hold attention, guide the reader, intensify a visual message, speed interpretation, accentuate positives, establish mood, make sense and clarify ideas, explain and persuade (Eiseman, 2000 and DiMarco, 2010). Hue is another name for color. Saturation is a term to describe the intensity of a color. Saturation is also called chroma, and it refers to how little or how much gray a color contains (Eiseman, 2000). The highest saturation occurs in colors that are pure and unmixed. Value is the lightness or darkness of a color. The temperature of a color affects how that color communicates. The primary colors red and yellow are warm, while blue is a cool primary color. The secondary colors violet and green are cool, while orange is a warm secondary color (Figure 13).
2.2.4.1 Color Schemes

Color schemes are selections or combinations of colors used to create value contrast (variety) or harmony (unity) (DiMarco, 2010). “A scheme comprised of any two colors and their tints and shades that are directly opposite one another on the color wheel is a complementary color scheme, which is the most contrasting of relationships”. The use of two complementary colors will cause a visual vibration and will excite the eye” (Stone, Morioka
“A juxtaposition of any hue and the two colors located on either side of its complement is a split complementary color scheme”. The contrast is toned down somewhat, providing a more sophisticated relationship.” (Stone, Morioka and Adams, 2008).

The double complementary color scheme “consists of a combination of colors that are adjacent to one another on the color wheel”. “As complements increase the apparent intensity of each other, not all color sets will be pleasing. Avoid using equal volumes of the four colors to make the scheme less jarring”. An analogous color scheme is a “combination of two or more colors that are spaced equally from each other on the color wheel. These colors have similar light ray wavelengths, so they are easiest on the eye”. Triadic color schemes are “combinations of any three colors that are spaced equally around the color wheel. Triads with primaries are garish, but secondary and tertiary triads provide softer contrast. Triads in which two of the colors share a common primary may seem more pleasing” (Stone, Morioka and Adams, 2008).

Monochromatic color schemes consist of any single hue and all of its tints and shades. “This color scheme explores the variety in the saturation and lightness of one color to form an allied combination of similar colors. A hue combined with a percentage of its complement or black” is a neutral color scheme. Offbeat combinations consisting of one hue and one color to the right or left of its complement” are referred to as incongruous color schemes. Achromatic color schemes are “combinations of black, white, and gray hues.” (Stone, Morioka and Adams, 2008).

When choosing colors, dramatic contrasts in hue, value, saturation and brightness will enhance legibility for design especially for color blindness and an aging population. According to the Americans with Disabilities Act (ADA), a 70 percent contrast between an
object and its background is the minimum contrast for the best function. The ADA also suggests using dark type on a light background for better legibility. Both physical environment and culture differences will affect how people interpret colors. When designing with colors different kinds of visual deficiencies need to be considered, such as aging eyes and color blindness including protanope, dueteranope, and tritanope (O’Grady, 2008).

2.2.4.2 Aging Eyes

More than thirteen percent of the population of the United States is over 65 years old and the number is continually growing. Aging eyes usually have difficulties in differentiating colors and start to suffer from loss of light, loss of ocular focus, and other serious vision problems. Sans serif typefaces tend to work better for aging eyes compared to serif typefaces, and the larger the type size the better. Paul Nini gave the following recommendations for designing for aging eyes (Nini, 2006):

- Consistent stroke widths
- Open counterforms
- Pronounced ascenders and descenders
- Wider horizontal proportions
- More distinct forms for each character (such as tails on the lowercase letters “t” and “j”)
- Extended horizontal strokes for certain letterforms (such as the arm of the lowercase letter “r” or the crossbar of the lowercase letter “t”).
2.2.5 Visual Hierarchy

Visual hierarchy is “an arrangement of elements in a graduated series, from the most prominent to the least prominent, in an area of typographic space.” Repetition, contrast of size, weight, color, tone, texture and spatial interval can create hierarchy. Location and special relationships are very important in the arrangement. When creating a visual hierarchy, harmony, emphasis, and vitality should be considered (Carter, Day and Meggs, 2007).

Menus have complicated information that needed to be displayed in limited space, including food categories, name of dishes, ingredients, descriptions, prices, and sometimes images of food. It is important to group information into different levels and to provide multiple entry points so viewers can scan organized information easily. Visual hierarchy on menus could reduce information overload and anxiety.

2.2.6 Readability

Readability is “type’s capacity to attract and hold a reader’s attention by engaging the viewer with a strong typographic visual”, and it “adds aesthetic value to a design piece and makes it noticeable and interesting to the viewer.” Readability is important for display type like headlines (DiMarco, 2010).
2.2.7 Legibility

Legibility is “type’s capacity to deliver a message to the reader.” It is the crucial aspect for body copy because text type focuses on communication rather than drawing attention (DiMarco, 2010).

When designing for digital devices, the conditions of screen resolution and luminescence need to be taken into consideration. Typefaces with fine details such as fine serifs, ultrathin strokes, small counters and other visual eccentricities may reduce legibility when color is not carefully chosen (Carter, Day and Meggs, 2007).

2.2.8 Typography

Seaberg listed several typographic principles that should be used when composing a menu in his book *Menu Design: Merchandising and Marketing* (1991). Body copy should be set in a typeface no smaller than twelve points with at least three points of leading between the lines for maximum readability. Readability is increased when uppercase letters are only used for heads and subheads, and lowercase letters are used for the majority of the menu text. Typefaces should be selected to match the character of your restaurant, using strange, exotic typefaces sparingly. Type, if in a color, should always be in a dark color that creates a high contrast between the type and the paper. Menu designers should avoid reversed type. Uppercase letters and italics are tiring to the eye and hard to read in large amounts, so should be used sparingly, to add emphasis (Seaberg, 1991).
2.2.8.1 Typefaces

According to Nancy Scanlon, six commonly used typefaces in menu design are Commercial Script, Helvetica Thin, Zapf Chancer Medium Italic, Goudy Cursive, Bodoni, and Bodoni Open (Scanlon, 1999) (Figure 14).

Figure 14. Six commonly used menu design typefaces
2.2.8.2 Type Styles

Type styles include roman, regular, bold, semibold, italic, book, oblique, heavy, black, condensed, thin, and bold italic. Typefaces can be divided into six main categories: Serif, sans serif, Slab serif, Script and cursive, Black letter, decorative and symbol (DiMarco, 2010).

“Serif typefaces have cross lines at the top and bottom ends of the letter strokes. Most body text is set in serif typefaces because the lines draw the eye along the type. Serif typefaces are the base style of roman (medium weight) fonts; serif fonts can be used for display (headline) type also, but they will not have the same visual strength as sans serif font due to their flowing tails. Serif fonts can, however, give a composition a softer feel, due in part to the letterforms’ organic curves. Serif fonts include classic typefaces such as Garamond, Times New Roman, Caslon, Bodini, and Goudy.”

“Sans serif typefaces are characters without serifs and have a modern, industrial style. Because sans serif fonts have geometric attributes, which are easily understood, they are frequently used for headlines, logos, and reverse type (white type on a dark background). Some common sans serif fonts are Helvetica, Gill Sans, Futura, Folio, Avant Garde, Swiss, Arial, and News Gothic.”

Slab serif typefaces have a heavier stroke at the ends of letters. Slab serifs work well in headlines and intermediated type but not in large quantities of body copy, because the slabs clog up the spacing of smaller letters.

“Scrip and cursive typefaces are designed to look like handwriting and can provide a composition with elegance if used properly.” These fonts have low legibility and should be used sparingly.
“Black letter typefaces are also known as gothic or text letter fonts. Old English and San Marco are common black letter fonts.” They should be used sparingly as well.

“Decorative typefaces are fonts with abstract or elaborate letters that create a look of novelty. Common decorative fonts are Comic Sans, Critter, and Stop.” They have inconsistent quality and lack of serious aesthetic value and are rarely used by professional designers.

Symbol typefaces are geometric figures and illustration (Scanlon, 1999).

A study conducted by Martin shows that Arial, Georgia and Verdana are the most commonly used fonts for body copy on screen while Arial, Verdana and Helvetica are used for headlines. Lucida Grande is another font that often used by designers for both body copy and headlines on screen (Martin, 2009).

2.2.8.3 Typographic Personality

According to Kristin Cullen, typefaces have their own characteristics and personalities. They can be cold, warm, simple, intimidating, sophisticated or friendly, and these personalities will help to build the attitude of the entire design as well as to support legibility and readability. In order to serve the communicative function of the design, typefaces need to be chosen carefully.

Typefaces in general can also be divided into five main classifications: Old Style, Transitional, Modern, Slab Serif, and Sans Serif. In most applications, typefaces are chosen among these five classifications. Display and Script classifications account for decorative typefaces that do not fit elsewhere (Cullen, 2005).
In general, Serif typefaces include Old Style, Transitional and Modern. Serif appear more traditional, mature and serious. They are considered as classic, elegant and timeless, but sometimes too conservative (Cullen, 2005).

Sans serif typefaces first appeared in the nineteenth century and responded to Industry Revolution. Comparing to Serif typefaces, they are designed as more contemporary with a simple and clean look (Carter, Day and Meggs, 2007).

Slab Serif typefaces are also considered modern, but their hybrid appearances are bold and masculine, providing exotic and foreign qualities (Samara, 2004).

### 2.2.9 Images

Research shows that the combination of text and image helps readers to retain information. Images will grab readers’ eyes more easily than text does. “Flip through” readers would prefer to read the caption of an intriguing image rather than read a paragraph. People scan patterns and differences in order to read quickly. Changes in weight and scale of images and elements will help information to be noticed (Baer, 2008).

### 2.2.10 Layout

Layout is one of the key components in menu design. Research shows that customer selections of menu items are influenced by the visual layout of the menu (Pavesic, 2000; Hug and Warfel, 1991; Frei, 1995;) Early menu design drew inspiration from newspaper layout, which was to display the most important articles at the top right of the front page, where the eyes tend to be drawn (Carter, Day and Meggs, 2007). Researchers also believed that a
successful menu should have fifty percent white space, “with art and copy occupying the balance of the area.” (Panitz, 2000).

The use of images makes it much easier for diners to make decisions. Arnoult argued that the menu’s image is “not only an artistic presentation but validates the restaurant’s expertise and authority” (Arnoult, 1998). Images also help to communicate the identities of items (Cichy and Hickey, 2005).

Most menus use portrait orientation, possibly due to the influence of newspaper design on early menu design. Landscape orientation is seldom used.

### 2.2.11 The Ten Commandments of Menu Design

Allen Kelson formulated his ten commandments about menu development and design in 1994 (Kelson, 1994):

- Speak plainly. Use words that readers can understand, especially for ethnic items.
- Say what is important. Explain clear what’s inside the ingredients and anything unique or overwhelming about flavor, diets and allergies.
- Do not be afraid to be descriptive. Use descriptive words such as “fresh”, “local” would help readers to build mental images about food and increase the sell if used properly.
- Say it correctly. All terms used on the menu should be as accurate as possible.
- Describe accompaniments. Descriptions should support the main item so readers will fully understand the experience.
• Remember, “Less is more.” Describe only special ingredients that add value and flavor to food items.

• Maintain a sense of perspective. Recommend no more than two or three menu items in each menu category.

• Spell it properly. Spelling and grammar should be double checked before printing.

• Punctuate properly. Use hyphenated compound adjectives.

• Follow rules of good typography. Use appropriate color, typeface and font sizes to enhance readability and legibility. Don't align prices to the right margin because it makes it too easy for guests to compare prices.

2.2.11 The Future of Menu Design

Charles Bernstein stated in Nation’s Restaurant News that “casualization” and personalizing of a restaurant would increase sales and customer counts. He strongly recommended restaurants to take a personal approach (Miller and Paversic, 1996).
2.3 User Interface Design, Usability and User Experience

2.3.1 The importance of user experience

Negative user experiences can respond in two ways, psychological and physical. Users’ psychological responses to poor design and negative user experience include confusion, annoyance, frustration, panic or stress and boredom, while users’ physical responses to poor design and negative user experience include abandonment of the system, partial use of the system, indirect use of the system, modification of the task, compensatory activity, or misuse of the system (Baer, 2008).

Chunk is a term used widely in user interface design. Based on the psychological “seven plus or minus two” theory, items should be divided around the number of seven into small chunks in order to reduce memory load in people’s short-term memory. Users will likely forget what they read if the list includes more than ten items. But if items are listed in alphabetical order or in a timeline, they don't need to be chunked into small groups. According to Colborne, chunking works best when users need to evaluate different possibilities instead of trying to find items' locations (Colborne, 2011).

Lining up items in an invisible grid will not only create a clean and simple design but also draw users’ attention effectively. Applying an asymmetric layout can reduce regimented and constricting features of a design, such as using an odd number of columns or placing one element straddling several columns (Colborne, 2011).

Visual clutter will increase users’ processing time and working load when they deal with information. Reducing visual clutter will increase hierarchy and help users to
concentrate on important features on the screen. Lines in the foreground of the screen draw unnecessary attention; using white space or subtle background tints to divide the space reduces visual clutter. Fine light lines should be used instead of thick dark lines when they can serve similarly in function. Information should be limited to just two or three levels. Variations of elements should be limited in terms of the number, size and weight of fonts, styles, shapes, and use of emphasis (Colborne, 2011).

Tufte defined the term “data-ink ratio” in his book, *The Visual Display of Quantitative Information*, arguing against decoration used for displaying information, and he insisted ink and pixels should be used only when it is related to content or repeating content (Tufte, 1983).

### 2.3.2 Information Overload and Information Anxiety

Bertram Gross first mentioned the term Information Overload in 1964 and later on Alvin Toffler defined the term as the inability that people have to understand and process information as well as to make decisions due to being exposed to too much data and information (Gross, 1964, Toffler, 1970, Yang, Chen and Honga, 2003).

Information Anxiety, a term first used in 2000 by Richard Wurman in his book, *Information Anxiety*, was defined as “the black hole between data and knowledge”, and it is a condition created by exposure to massive amounts of information with no clarity of message. The way of presenting information will affect users’ motivation and concentration (Wurman, 2000).
In order to avoid information overload and information anxiety, Visocky O’Grady suggested that everything should serve a function and design need to provide options for different users (Visocky O’Grady, 2008).

2.3.3 Designing for a Variety of Users

Users are typically divided into three categories: experts, mainstreamers and willing adopters (Colborne. 2011).

Experts are willing to explore products or services and to push the limits of what the interface can do. They like to spend time on new products and features and they tend to customize the products by themselves.

Willing adopters are familiar with the interface and system and they could try something more sophisticated when easy and clear directions are provided. Both experts and willing adopters are the minority in users.

Mainstreamers are the vast majority of users, and they just want to finish their task rather than explore the features and technologies in the design. They will learn to use key features when needed, but will not try special features. They value a design based on the ease of control, and they need reliable results rather than perfect results. Successful and simple designs should meet mainstreamers’ needs, but not the needs of experts’ or willing adopters (Colborne. 2011).
2.3.4 Consistency

Consistency is one of the key aspects of usability in user interface because it leads to ease of learning and ease of use. Consistency will enhance users’ possibilities for transfer of skills from screen to screen and system to system, as well as improve users’ productivity and reduction of errors. Users will be able to predict what will happen based on what they already know. Consistency will also help users to be more self-confident when using the system and reduce pressure. Consistency should be applied to each page and within the platform. A common way to achieve consistency in user interface design is to produce a style guide, including specific design rules and a general guideline. Simplicity is a powerful tool to achieve consistency in design (Nielsen, 1989).

2.3.5 Rendering on the screen

When type is rendered on a screen, details such as stroke weight, subtle curves, and serif details are deduced to a coarse approximation of the refined forms found in the original design. This occurs because curved and diagonal edges are rendered as pixels on a raster-scan display, giving the edges a jagged stair-step quality, called “the jaggies” (Kershaw, 2009). Fonts tend to render much heavier on a Mac OS and iOS platform compared to a Windows platform. Georgia and Verdana are specially designed fonts for screen design. The most commonly used fonts on iPad in the iOS 5 system include Arial, Baskerville, Bodini 72, Courier, Futura, Georgia, Gill Sans, Helvetica, Optima, Times New Roman and Verdana (Ahrens, 2012).
2.3.6 User Interface Design Principles

The Nielson Norman Group suggests getting rid of flash content to make websites iPad-friendly. Other suggestions include: creating larger targets and pad targets so that they tolerate touch better, spacing links wherever possible, minimizing the need for typing, and grouping controls or pieces of information that are related (to avoid having content ignored because it’s below the fold) (Budiu and Nielson, 2011).

Apple’s Human Interface Guideline suggests the minimum target size for touch screens and affordances of 44 pixels wide by 44 pixels tall. Microsoft’s Windows Phone UI Design and Interaction Guide suggests 34 pixels, and no smaller than 26 pixels. Nokia’s developer guidelines suggest no smaller than 1cm by 1cm or 28 pixels in order to avoid the “fat-finger” problem. Users could hit the wrong targets easily if those targets are too crowded (too close to each other). Users expect padding in tabular views, and they expect to hit the area around text to select the target. If any area or elements on the screen is touchable, it needs to look like it’s touchable. Otherwise users will not touch it (Budiu and Nielson, 2011).

Computing information for the users and offering a list of information if possible can minimize user input on the iPad. The interface design should be tolerant of typos, offer corrections, and accept incomplete information. Give Users should be given visible cues (arrows, tips) that they need in order to use the swipe gesture. Pages should contain enough space for swiping next to the two vertical sides. Carousels and other design features that interfere with swiping should be avoided, used infrequently or kept in only one dimension. A back button will allow users to undo any accidental touches on the screen, and the back button should work on every page including the homepage (Budiu and Nielson, 2011).
Studies show that slightly more users prefer the landscape orientation, which may be due to their familiarity with computer monitors. Users tend to switch orientations when an impasse occurs. Animations, noises and videos should be avoided when launching an application, and navigation controls should always be visible on every page (Budiu and Nielson, 2011).

Structure is the key component in information graphics to help readers navigate through complex information and convey additional meaning (Baer, 2008). “Flatland” was defined by Tufte in Envisioning Information (1990) as the flat, two-dimensional paper or video/computer screen media used in information design. Tufte believed “escaping flatland” is the key goal in designing the presentation of information. He also mentioned information density (quantity) and resolving power (clarity) in information design (Tufte, 1990).

Psychologist Paul Fitts published his theory about human movement and interface in 1954. Fitts’s Law stated that users would hit a target quicker if it was bigger or closer to a user’s mouse cursor. If the target was smaller, users needed to pay extra attention to hit the right place, which would slow down their behavior. Fitts also mentioned that the direction of the motion matters and the size of the target should correspond to the direction of the motion. Adding margins between small targets will make them easier to hit (Mathis, 2011 and Nielson Norman Group, 2011).

Animation is one of the advantages that the digital screen has in comparison to traditional display. Animated visual cues help users to understand what is happening on the screen by explaining the changes in the stage, directing user attention to small or unnoticeable changes, and forming suitable mental models. At the same time unnecessary
and unimportant animations should be avoided because movements will also cause confusion (Mathis, 2011).

2.3.7 The Psychology of Menu Selection

Norman (1988) described five basic evaluation factors in menu selection. These factors attempted to capture the basic dimensions of menu systems that users responded to as the most important features in menu selection. The five basic factors included display and response time, path efficiency, a sense of direction toward a goal, clarity of the menu, and error recovery (Norman, 1988).

2.3.8 Design for Digital Devices

Jakob Neilson first brought up F-Shape Pattern (scanpath for website and iPad) in his report the F-pattern is a rough, general shape that shows the users path while reading a website. The size and location of user F-patterns will help designers find how they need to design efficiently and wisely (Neilson, 1999) (Figure 15).
Figure 15. Neilson’s F-Shape Pattern for website

Important things should be displayed in large sizes, and they can be out of scale if needed. While at the same time less important items need to be smaller. A rule that may be applied here is: if something is half as important, it should be one quarter as big. Small items need to be placed close together in order to reduce the need for visual clutter such as color-coding, labels, or boundary boxes to explain how they are related.

For touch screens specifically, navigation items should be placed at the bottom of the screen in order to prevent users from covering up the screen with their hands accidentally. Navigation on the left or the right of large screens may cause problems for right- or left-handed people respectively (Colborne, 2011).

Bright, saturated colors should be used to make categories more important than others, creating layers that pop off the page (Colborne, 2011). Show status gives feedback so users know what to do and what has been done.
Natural User Interfaces (NUIs) are interfaces based on direct, natural manipulation of realistic objects and gestures, other than a keyboard and mouse. NUIs rely on multi-touch screens that allow users to interact with the interface directly, using hands and fingers, with voices, or moving the entire body. Compared to Graphic User Interfaces (GUI), which are considered as metaphoric and exploratory, NUIs are considered as direct and intuitive (Mathis, 2011).
CHAPTER 3. METHODOLOGY AND CASE STUDIES

3.1 Methodology

Case studies were applied as the methodology of this study. The purpose of the case studies was to analyze and understand both existing traditional print paper menu design and newly developing digital menu design, and to determine and provide digital menu design guidelines to menu engineers, designers and restaurant operators.

The four casual dining restaurants, which were selected here for case studies, are Applebee’s, The Cheesecake Factory, Stacked, and Carmel Café, representing well-designed, trendy current menu designs of casual dining restaurants in the hospitality industry in the United States. Applebee’s and The Cheesecake Factory are among the most popular casual dining neighborhood-style restaurant chains within and outside the United States, while Stacked and Carmel Café are relatively new, fast-growing casual dining restaurants, and are using iPads as their newly-updated digital menus. Although these selected restaurants serve similar food items and dishes, the way in which they design their menus are quite different from each other in terms of visual components, graphic elements and user interface.

In order to evaluate all these selected restaurants’ menu designs, this study created a menu design criteria matrix with a rating scale. The matrix utilizes different groups of criteria to define the most important design components in restaurant menu design. The next chapter’s design proposal of a digital menu will be based on the analysis from case studies, the matrix evaluation, and analysis of the literature review from the previous chapter.
3.1.1 Design Guidelines

3.1.1.1 Information Content

- **Quantity of Content**
  
  The design delivers the message clearly, effectively and appropriately, without causing information overload and information anxiety.

- **Levels of Content**
  
  The menu provides both general information and detailed information options to meet different users’ needs, such as ingredients for information and nutritional information and allergen information for diners’ who have diet concerns.

- **Attitude of Content**
  
  Menu content is presented as inviting and engaging to diners, as well as communicative and informative, which meets communication function, marketing function and aesthetic function.

3.1.1.2 Typography

- **Personality**
  
  Typefaces are chosen appropriate to help users to form a positive attitude towards the restaurants and send concept of the brand, and also match the whole design of the restaurants.

- **Legibility**
  
  Size and weight of type are set for appropriate contrast to effectively
distinguish content from the background and other information; suitable alignment is chosen to help users to scan and read more easily and quickly. Line lengths set are in comfortable measures, usually for content, no more than 10 words per line.

- **Harmony and Consistency**

  When using multiple typefaces or changes in styles of the same typeface, combination create harmony and pleasant reading experience for users, not visual chaos. Same typefaces are used continuity crossing platforms in order to build consistency.

### 3.1.1.3 Layout and Hierarchy

- **Layout**

  Clear and evident layout provides a strong sequence, leading users to navigate through complex information. The layout is used consistently through the entire menu design.

- **Columns**

  Columns are suitable for existing information, dividing and grouping content for clarity.

- **Entry Points**

  The menu has strong sequence and a dominant focal point and multiple entry points to allow users to seek and locate information quickly.

- **Organization**
All elements on the menu are ranked and organized into dominant and subdominant levels, including foreground, middle ground, and background.

3.1.1.4 Color

- **Color Harmony**
  Color schemes used in the menu design is pleasing and engaging, helps to evoke favored emotions for users, create value and enhance brand identity with a balance visual experience.

- **Color Contrast**
  Colors are tested for low lighting situation, color blindness and aging eyes.

- **Color Impact**
  Color combinations create impacts on the viewer. Vivid contrast can grab and hold attention and leading eyes for in depth look, without being overpowering or distracting for users.

- **Color-coding**
  Color-coding is used for grouping information and creating information flow.

3.1.1.5 Images and Graphic elements

- **Image setting**
  Images are used in appropriate quality, proportion as well as resolution, to draw users’ attention and make them interested in reading related text.
• **Clarity**

Images are attractive to viewers. Images also present specific food items clearly and convey clear messages, which help diners to make decision with ease.

• **Graphic elements setting**

Graphic elements are set in appropriate colors and sizes to attract the eyes and provide direction and punctuation for users to find desired information with ease.

• **Legibility**

Graphic elements have good legibility to convey meanings without confusing users.

### 3.1.1.6 Usability

• **Target**

The size of the target that needs to be touched or tapped is no smaller than 44 pixels wide by 44 pixels for users.

• **Visual cues**

Clear visual cues like arrows and dots are used to indicate a specific area requires gestures such as swipe or tap.

• **Navigation controls**

Navigation bar is visible on every single page of the whole user interface, including a back button that allows the users to undo any accidental and unwanted touches.
• **Feedback**

Feedback is always provided to users so they get a clear sense of what status they are at and what they need to do for the next step.

• **Customization**

User interface allow different users to find the information they are seeking for by using search engine, filter and others, to fulfill their needs and preference.

### 3.1.2 Evaluation Matrix

Based on literature review, an evaluation matrix is built as guidelines to analysis existing paper and digital menus. The optimist design should meet all the following categories, and each sub category has a maxim score of three and minimum score of zero, rating from excellent (three points), good (two points), fair (one point) and poor (zero point).

- **Information Content** (Total score: Nine ) \(3 \times 3 = 9\)
  - **Quantity of Content**: The design delivers the message clearly and appropriately, displaying approximate five to seven pieces of information on each screen, and no more than ten should be arranged on the same page, without causing information overload and information anxiety, while at the same time to use the space on the screen effectively.
  - **Levels of Content**: The menu provides logical information hierarchy and differentiates general information and detailed information clearly and appropriately to meet different users’ needs, such as ingredients for information and nutritional information and allergen information for diners’ who have diet concerns. Different
levels of content are well organized and understandable.

- **Attitude of Content**: Menu content is communicative and informative, which provides pleasant experience to diners to read and order, and reflects the brand identity of the restaurants.

- **Typography (Total score: Nine) 3×3=9**
  - **Personality**: Typefaces are chosen appropriate to help users to form a positive attitude towards the restaurants and send concept of the brand, and also match the whole design of the restaurants.
  
  - **Legibility**: Size and weight of type are set for appropriate contrast to effectively distinguish content from the background and other information; suitable alignment is chosen to help users to scan and read more easily and quickly. Line lengths set are in comfortable measures, usually for content, no more than 10 words per line.
  
  - **Harmony and Consistency**: When using multiple typefaces or changes in styles of the same typeface, combinations create harmony and pleasant reading experience for users, not visual chaos. Same typefaces are used with continuity crossing platforms in order to build consistency.

- **Layout and Hierarchy (Total score: Twelve) 4×3=12**
  
  - **Consistent structure**: Clear and evident layout provides a strong sequence and consistent structure, leading users to navigate through complex information. The layout is used consistently through the entire menu design.
  
  - **Columns**: Columns are suitable for existing information, dividing and grouping content for clarity.
- **Entry Points**: The menu has a strong sequence and a dominant focal point and multiple entry points to allow users to seek and locate information quickly.

- **Organization**: All elements on the menu are ranked and organized into dominant and subdominant levels, including foreground, middle ground, and background.

- **Color** (Total Score: Twelve) $4 \times 3 = 12$
  - **Color Harmony**: Color schemes are pleasing and engaging to viewers, and evoke favored emotions, create value and enhance brand identity with a balance visual experience.
  - **Color Contrast**: Colors are tested for low lighting situation, color blindness and aging eyes by simulations.
  - **Color Impact**: Color combinations create impacts on the viewer. Visual hierarchy can grab and hold viewers’ attention and lead them for in depth look, without being overpowering or distracting for users.
  - **Color-coding**: Color-coding is used for grouping information and creating information flow.

- **Images and Graphic elements** (Total Score: Twelve) $4 \times 3 = 12$
  - Images are used in high quality, appropriate proportion as well as resolution, to draw users’ attention and make them interested in reading related text.
  - Images are focused, well composed and present specific food items clearly and convey clear messages, which help diners to make decision with ease.
  - Size and Color: Graphic elements are set in appropriate colors and sizes to attract the eyes and provide direction and punctuation for users to find desired information with
Legibility: Graphic elements have good legibility to convey meanings without confusing users.

- **Usability** (For digital menu only) (Total Score: Fifteen) $5 \times 3 = 15$
  - **Target size**: The size of the target that needs to be touched or tapped is no smaller than 44 pixels wide by 44 pixels for users.
  - **Visual cues**: Clear visual cues like arrows and dots are used to indicate a specific area that requires gestures such as swipe or tap.
  - **Navigation controls**: Navigation bar is visible on every single page of the whole user interface, including a back button that allows the users to undo any accidental and unwanted touches.
  - **Feedback**: Feedback is always provided to users so they get a clear sense of what status they are at and what they need to do for the next step.
  - **Customization**: User interface allow different users to find the information they are seeking for by using search engine, filter and others, to fulfill their needs and preference.
<table>
<thead>
<tr>
<th>Categories</th>
<th>Sub Categories</th>
<th>Excellent (3)</th>
<th>Good (2)</th>
<th>Fair (1)</th>
<th>Poor (0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information Content</td>
<td>Quantity of Content</td>
<td>The design delivers the message clearly, effectively and appropriately, without causing information overload and information anxiety.</td>
<td>Most content in the menu delivers the message clearly, effectively and appropriately, without causing much information overload and information anxiety.</td>
<td>The menu content delivers the message to the users, but the content is too limited that cannot fulfill users’ needs. Or it causes information overload and information anxiety.</td>
<td>The design fails to deliver the message clearly, effectively and appropriately. In fact, it lacks of information or it causes information overload and information anxiety.</td>
</tr>
<tr>
<td>Levels of Content</td>
<td></td>
<td>The menu provides both general information and detailed information options to meet different users’ needs, such as ingredients for information and nutritional information and allergen information for diners’ who have diet concerns. Different levels of content are well organized and understandable.</td>
<td>The menu provides both general information and detailed information, and most of the content is organized and understandable.</td>
<td>Information on the menu contains useful messages but is not well organized and easy to understand.</td>
<td>Neither general information nor detailed information is provided clearly or accurately on the menu.</td>
</tr>
<tr>
<td>Attitude of Content</td>
<td></td>
<td>Menu content is presented as inviting and engaging to diners, as well as communicative and informative, which meets communication function, marketing function and aesthetic function.</td>
<td>Most of the content is inviting and engaging to diners, and communicative as well as informative.</td>
<td>More than half of the content does not communicate effectively.</td>
<td>Menu content is not communicative and informative, and cannot provide inviting and engaging experience for diners.</td>
</tr>
<tr>
<td>Typography</td>
<td>Personality</td>
<td>Typography</td>
<td>Personality</td>
<td>Typography</td>
<td>Personality</td>
</tr>
<tr>
<td>------------</td>
<td>-------------</td>
<td>------------</td>
<td>-------------</td>
<td>------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Typefaces are chosen appropriate to help users to form a positive attitude towards the restaurants and send concept of the brand, and also match the whole design of the restaurants.</td>
<td>Typefaces deliver the concept of brand identity and match the whole design of the restaurants in terms of consistency.</td>
<td>Typefaces are used consistently in the design.</td>
<td>Typefaces are not appropriate for brand identity.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Legibility</td>
<td>Size and weight of type are set for appropriate contrast to distinguish content from the background effectively. The minimum size of type is 12 point, and suggested size for body text is 14 point. Use standard weight instead of condensed weight for good legibility. Set up suitable alignment to help users to scan and read more easily and quickly. Line lengths are in comfortable measures, usually no more than 10 words in each line for the content.</td>
<td>For the most part, size and weight of type are set for clear contrast to effectively distinguish content from the background and other information; suitable alignment is chosen to help users to scan and read more easily and quickly. Line lengths set are in comfortable measures.</td>
<td>For more than half of the design, size and weight of type are set for appropriate contrast to distinguish content from the background and other information; suitable alignment is chosen to help users to scan and read more easily and quickly. Line lengths set are in comfortable measures.</td>
<td>Size and weight of type are not set for appropriate contrast. Alignment fails to help users to scan and read more easily and quickly. Line lengths are not comfortable for users to scan information.</td>
<td></td>
</tr>
<tr>
<td>Harmony and Consistency</td>
<td>When using multiple typefaces or changes in styles of the same typeface, combination create harmony and pleasant reading experience for users, not visual chaos. Same typefaces are used continuity crossing platforms in order to build consistency.</td>
<td>Typeface combination works for the most of the time on the menu design.</td>
<td>Too many typefaces are used together without creating visual harmony.</td>
<td>Typeface combination creates visual clutters and chaos, and does not provide positive reading experience for users.</td>
<td></td>
</tr>
</tbody>
</table>

Table 1. (Continued)
<table>
<thead>
<tr>
<th>Entry Points</th>
<th>Organization</th>
<th>Images and Graphic elements</th>
<th>Clarity</th>
</tr>
</thead>
<tbody>
<tr>
<td>The menu has a strong sequence and a dominant focal point and multiple entry points to allow users to seek and locate information quickly.</td>
<td>All elements on the menu are ranked and organized into dominant and subdominant levels, including foreground, middle ground, and background.</td>
<td>Images are used in appropriate quality, proportion as well as resolution, to draw users' attention and make them interested in reading related text.</td>
<td>Images are attractive and present specific food items clearly and convey clear messages, which help diners to make decisions with ease.</td>
</tr>
<tr>
<td>Focal point and entry points are used to help users navigate through the information.</td>
<td>Most elements on the menu are ranked and organized into dominant and subdominant levels, including foreground, middle ground, and background.</td>
<td>Most images are used in appropriate quality, proportion and resolution, and draw users' attention.</td>
<td>Most Images are attractive and present specific food items clearly and convey clear messages, which help diners to make decisions with ease.</td>
</tr>
<tr>
<td>The menu does not have a strong sequence.</td>
<td>Elements are ranked and organized.</td>
<td>Half of the images have appropriate quality, proportion and resolution.</td>
<td>Half of the images are attractive and present specific food items clearly and convey clear messages.</td>
</tr>
<tr>
<td>Too many or too few entry points are on the menu, which is confusing for users.</td>
<td>Elements on the menu are not well organized and ranked.</td>
<td>Images have inappropriate quality, proportion and resolution.</td>
<td>Images do not have specific messages to deliver and are not understandable.</td>
</tr>
<tr>
<td>Graphic elements setting</td>
<td>Size and Color: Graphic elements are set in appropriate colors and sizes to attract the eyes and provide direction and punctuation for users to find desired information with ease</td>
<td>Most graphic elements are set in appropriate colors and sizes to attract the eyes and provide direction and punctuation for users to find desired information with ease</td>
<td>Half of the graphic elements are set in appropriate colors and sizes to attract the eyes and provide direction and punctuation for users to find desired information with ease</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Legibility</td>
<td>Graphic elements have good legibility to convey meanings without confusing users.</td>
<td>Most graphic elements are understandable with good legibility.</td>
<td>Half of the graphic elements are understandable.</td>
</tr>
<tr>
<td>Categories</td>
<td>Sub Categories</td>
<td>Excellent (3)</td>
<td>Good (2)</td>
</tr>
<tr>
<td>---------------</td>
<td>------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Usability</td>
<td>Target</td>
<td>The size of the target that needs to be touched or tapped is no smaller than 44 pixels wide by 44 pixels for users.</td>
<td>Most target sizes are suitable for touching and tapping.</td>
</tr>
<tr>
<td></td>
<td>Visual cues</td>
<td>Clear visual cues like arrows and dots are used to indicate a specific area requires gestures such as swipe or tap.</td>
<td>Most visual cues are visible and understandable.</td>
</tr>
<tr>
<td></td>
<td>Navigation controls</td>
<td>Navigation bar is visible on every single page of the whole user interface, including a back button that allows the users to undo any accidental and unwanted touches.</td>
<td>Navigation bar is presented on most of the screens.</td>
</tr>
<tr>
<td></td>
<td>Feedback</td>
<td>Feedback is always provided to users so they get a clear sense of what status they are at and what they need to do for the next step.</td>
<td>Feedback is provided for the most of the time.</td>
</tr>
<tr>
<td></td>
<td>Customization</td>
<td>Different users to find the information they are seeking easily by using search engine, filter and others, to fulfill their needs and preference.</td>
<td>Users can customize the interface.</td>
</tr>
</tbody>
</table>

Table 2: Evaluation Matrix for Digital Menu Specifically
3.2 Case Studies

3.2.1 Visual Analysis 1: Applebee’s

Applebee’s is a popular casual-dining restaurant chain in neighborhoods across North America with almost 2,000 locations and counting. They focus on serving good food and their branding concept is “There’s No Place Like The Neighborhood.” Applebee’s provide varieties of casual dining choices to meet consumers’ needs for healthy dining such as Under 550 Calories™ and Weight Watchers®.

Applebee’s’ website design (Figure 16) and paper menu design (Figure 17) share some basic visual elements in common, such as color palette, similar type choices and usage of images, which creates consistency across platforms and enhances brand identity as well.
Figure 16. Applebee’s Website
Figure 17. Applebee’s Two-Panel Paper Menu
Physical Format

Applebee’s’ paper menu (Figure 17) is a multi-page two-panel menu with ten pages as well as a front cover and a back cover, includes beverages, appetizers, entrees, specials, burgers, sandwiches and healthy choices. The paper menu has a dimension of 8.25 inches wide and 13 inches tall, which is easy for users to hold and read. It uses portrait orientation and is printed on coated paper; the reflection created by the dim light makes it hard for consumers to read the information on the surface of the menu.

Information Content
The printed menu has detailed descriptions for each food item, 30 words for each text block, about 400 words per page, around 3000 words for the entire menu. It is overwhelming and intimidating for and information overload can cause information anxiety, considering the research show that diners spend an average of two minutes reading menus. Other sub headings have better readability as well as legibility than “Sizzling Entrees” in terms of contrast.

**Typography**

In general, the typography of Applebee’s’ printed delivers the concept of neighborhood, casual dining (Figure 17, 18). Typefaces are chosen appropriate to help users to form a positive attitude and send personality of the brand concept. Used for descriptive copy is 14 pt but due to its very thin stroke and cream yellow background, it does not have good legibility. Multiple typefaces did not provide harmony to the entire design, instead, it cause visual kiosks to users because they are competing with each other, without creating good hierarchy to lead users’ eyes. Italic form is used to only emphasis on amount the text but with space between lines can be more open to help the text flow and make it easy for users to read. Sizzling entrees is the type of entrees that they want recommend there are two images used for this sub category, but due the the mixed typefaces choices and distracting background. More than three fonts size are used on each page of the menu. The typographic approach brings order and hierarchy to the menu design. Headings for food items are the first level of hierarchy on each page due to its large size and weight. Mixed typefaces, including part upper and lowercase script and part all caps sans serif are displayed together for one single heading. Headings are in bold and thick typeface, with shadows as another layer
underneath the headings. These shadows are distracting and are considered an unnecessary visual clutter. Body copy is very thin and lightweight, and it is the lowest level of hierarchy on each menu page. Prices are printed at the end of each menu item description without a dollar sign, which will reduce the pressure.

**Color**

The headings got lost on the distracting background, five pieces of photographs are used on this spread, one title was broke into two parts, are the combination of two typefaces and changes of styles didn’t provide visual harmony and pleasant.

The red bar is strong against the menu background, and it is the same color as the apple in its logo. The background is cream yellow, and the color of the text is extremely light and creates a very low contrast with the background, which reduces the legibility.

**Image and Graphic Punctuations**

Images take about one forth to one third of each page of the menu (Figure 17). On average there are three photographs featuring menu items with the name of the food item on top of the image on each page, and usually these images are of similar size. Images do help consumers locate Graphic punctuations and marks (Figure 19) are used to highlight terms and make recommendations. Four different icons used on Applebee’s menu are: Signature, Under 550 Calories™, Spicy, and Weight Watchers®. Small graphic marks do help dishes stand out and catch people’s attention easily. Dark blue creates a good contrast with red and represents power to grab the consumer’s eyes.
Figure 19. Applebee’s graphic icon

Layout

The basic layout of Applebee’s menu is a simple two-column format. Although they are committed to providing nutritional information as accurate as possible, there are no detailed descriptions about food items on the menu, such as specific information about food sensitivities or allergies. When reading menus, users need information so they can make dining decisions easily and quickly.

As it is shown in Table 3, Applebee’s Paper Menu delivers messages to diners, but too much information causes information overload and information anxiety. Typography needs to be approved by adjusting the typefaces and type sizes. The color scheme is good but color-coding needs to be applied for better consistency. Information should be organized more logically and effectively for better hierarchy. The images on the menu are set in good quality, which help the menu to communicate with diners. As a conclusion, Applebee’s Paper Menu design is good and gets a score of 24.
Table 3. Evaluation of Applebee’s Paper Menu

<table>
<thead>
<tr>
<th>Category</th>
<th>Applebee’s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information Content</td>
<td></td>
</tr>
<tr>
<td>Quantity of Content</td>
<td>2</td>
</tr>
<tr>
<td>Levels of Content</td>
<td>1</td>
</tr>
<tr>
<td>Attitude of Content</td>
<td>1</td>
</tr>
<tr>
<td>Typography</td>
<td></td>
</tr>
<tr>
<td>Personality</td>
<td>2</td>
</tr>
<tr>
<td>Legibility</td>
<td>1</td>
</tr>
<tr>
<td>Harmony and Consistency</td>
<td>1</td>
</tr>
<tr>
<td>Color</td>
<td></td>
</tr>
<tr>
<td>Color Harmony</td>
<td>2</td>
</tr>
<tr>
<td>Color Contrast</td>
<td>1</td>
</tr>
<tr>
<td>Color Impact</td>
<td>2</td>
</tr>
<tr>
<td>Color-coding</td>
<td>0</td>
</tr>
<tr>
<td>Layout and Hierarchy</td>
<td></td>
</tr>
<tr>
<td>Layout</td>
<td>1</td>
</tr>
<tr>
<td>Columns</td>
<td>2</td>
</tr>
<tr>
<td>Entry Points</td>
<td>1</td>
</tr>
<tr>
<td>Organization</td>
<td>1</td>
</tr>
<tr>
<td>Images and Graphic elements</td>
<td></td>
</tr>
<tr>
<td>Image setting</td>
<td>2</td>
</tr>
<tr>
<td>Clarity</td>
<td>1</td>
</tr>
<tr>
<td>Graphic elements setting</td>
<td>1</td>
</tr>
<tr>
<td>Legibility</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>24</td>
</tr>
</tbody>
</table>
3.2.2 Visual Analysis 2: The Cheesecake Factory

The Cheesecake factory is a casual dining restaurant chain located in the United States, providing upscale, casual, and full service dining to consumers. The Cheesecake Factory is famous for its large selection of entrees, cheesecakes and specialty desserts.

![The Cheesecake Factory Exterior](image1)

Figure 20. The Cheesecake Factory Exterior

![The Cheesecake Factory Interior](image2)

Figure 21. The Cheesecake Factory Interior
Both the exterior (Figure 20) and interior design (Figure 21) of The Cheesecake Factory are glorious, highly decorated with complex and fancy detailed elements. The interior design uses a warm color palette, which creates an inviting and welcoming environment for diners.

Figure 22. The Cheesecake Factory Website

On its homepage (Figure 22), The Cheesecake Factory website uses large and highly detailed photographs to display their popular and featured food items as promotions. In order to enhance brand identity, consistent design should not only go across menu pages, but match their website design, interior design and even exterior design. More simple and modern approach in website design and while website uses bold brown while menu design uses light cream yellow.
Figure 23. The Cheesecake Factory Menu: Appetizers and Specialties in 2012

Physical Format

The Cheesecake Factory paper menu (Figure) is a two panel multi-paged menu with more than 200 menu items organized over 20 pages. The menu has similar size in comparison to Applebee’s paper menu, with the size of including one introduction page, two pages of cocktails, one page of wines, one page of small plates and snacks, two pages of appetizers, seven pages of specialties, one page of salads, one page of sandwiches, one page of eggs and omelets, and three pages of cheesecakes, desserts and beverages. The menu is
designed in a portrait orientation. Research shows that consumers spend about two minutes on reading the menu. With more than 200 menu items, most people will flip through quickly and won’t look through to the last page (Gallup, Panitz, 2000).

**Typography**

The general typography on The Cheesecake Factory paper menu design (Image 27) is clean and neat, showing linear and fluid aspects in design. The choices of typefaces and other typographic arrangements provide young, elegant and feminine features. The typography in general partially defines the brand identity with light and joyful positive aspects, but is not very inviting to guests. The restaurant logo is designed based on a serif font and is decorated with curvy tails, providing an elegant aspect.

**Legibility**

There are as many as 17 words in one line, and the length is not set in appropriate length. The weight of the strokes should be neither to light nor too heavy to diminish legibility. Light typeface makes it hard to be distinguished from the background and other elements.

**Hierarchy**

Headings and copy are organized showing elegant aspects and matching the style of the logo to a certain degree. The Cheesecake Factory’s paper menu uses different serif typefaces for menu design in order to create hierarchy. Headings are lowercase in magenta; menu items are all caps in black but the size is much smaller; and body copy is in an upper-lower case Italic style with the smallest size on each page. Kerning of headings is too wide for type and almost breaks one word apart. All menu items are consistently center aligned on the paper menu. Center aligned
text has been widely used since the birth of menus. This alignment creates an elegant and fluid aspect with its rugged edges on the left and the right, but it is harder for readers to scan and look for information in comparisons to left-aligned text, especially when there is more than one column on each page.

**Color**

The paper menu uses a warm color palate, and all pages share a light cream-yellow background with a bright yellow border wrapping around it. It delivers positive and delightful experience to consumers, yet due to the relatively thin body copy, there is not good contrast between the type and background. The headings on each page use magenta.

**Layout**

No clear grid structure is applied to this menu design, and all contents are simply displayed inside one or two columns arbitrarily. It creates visual clutter and will confuse users, because information has too many entry points on each page.

**Image and Graphic Punctuation**

The Cheesecake Factory’s printed paper menu design is relatively plain in comparison to their website design, exterior and interior design. There are neither illustrations nor photographs used on the printed-paper menu, which makes it hard for diners to choose what to eat, due to the lack of images as visual assistants, especially when consumers are relatively new to the restaurant or who are not native. Color strip bars are used on both the top margin and bottom margin of the menu, which matches the brand identity. The menu also has some small graphic marks to highlight certain food items, but the size is very small and hard for diners to notice.
As it is shown in Table 4, with the total score of 10, the Cheesecake Factory’s Paper Menu needs to be improved in several aspects. More and detailed information needs to be provided for diners. Type sizes and weight and color scheme need to be reconsidered for better legibility. Lack of images makes the information on the menu hard to understand. In general the menu design is rated as fair.

Table 4. Evaluation of the Cheesecake Factory’s Paper Menu

<table>
<thead>
<tr>
<th></th>
<th>The Cheesecake Factory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information Content</td>
<td></td>
</tr>
<tr>
<td>Quantity of Content</td>
<td>1</td>
</tr>
<tr>
<td>Levels of Content</td>
<td>1</td>
</tr>
<tr>
<td>Attitude of Content</td>
<td>1</td>
</tr>
<tr>
<td>Typography</td>
<td></td>
</tr>
<tr>
<td>Personality</td>
<td>1</td>
</tr>
<tr>
<td>Legibility</td>
<td>1</td>
</tr>
<tr>
<td>Harmony and Consistency</td>
<td>2</td>
</tr>
<tr>
<td>Color</td>
<td></td>
</tr>
<tr>
<td>Color Harmony</td>
<td>1</td>
</tr>
<tr>
<td>Color Contrast</td>
<td>0</td>
</tr>
<tr>
<td>Color Impact</td>
<td>1</td>
</tr>
<tr>
<td>Color-coding</td>
<td>0</td>
</tr>
<tr>
<td>Layout and Hierarchy</td>
<td></td>
</tr>
<tr>
<td>Layout</td>
<td>1</td>
</tr>
<tr>
<td>Columns</td>
<td>0</td>
</tr>
<tr>
<td>Entry Points</td>
<td>0</td>
</tr>
<tr>
<td>Organization</td>
<td>0</td>
</tr>
<tr>
<td>Images and Graphic elements</td>
<td></td>
</tr>
<tr>
<td>Image setting</td>
<td>0</td>
</tr>
<tr>
<td>Clarity</td>
<td>0</td>
</tr>
<tr>
<td>Graphic elements setting</td>
<td>0</td>
</tr>
<tr>
<td>Legibility</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
</tr>
</tbody>
</table>
3.2.3 Visual Analysis 3: Stacked

Stacked is a newly opened casual restaurant chain based in the California area, which is armed with iPads as advanced digital menus.

Figure 24. Stacked Exterior

(http://www.facebook.com/stackedrestaurants)

Figure 25. Stacked Interior

(http://www.facebook.com/stackedrestaurants)
Figure 26. Stacked Paper Menu

Physical Format

There are two kinds of menus used in Stacked Restaurants: paper menus and a digital menu. The paper menu (Figure 26) is in a portrait orientation and it has eight pages: one page for sauces, appetizers and sides, one page for salads, one page for burgers, one page for pizzas, one page for stacked mac and kids’, one page for desserts, one page for wines and one page for beers.

Typography

The typography of Stacked printed-paper menu is tight. All set dishes are listed in the left columns and others are listed in the right part image 30. Although left aligned text is easy for
guests to read, the line length of body copy is too long for consumers to read. The printed menu uses all caps for section headlines and sans serif fonts for both headlines and body copy. The noisy background is quite distracting for readers and does not have enough contrast with either headlines or body copy–both of them get lost in the background.

**Color**

In order to create variations, headings use the same color as the Stacked Logo with different tints. Stacked uses a pure, plain, neat background to create good contrast with headings and body copy. For consistency purposes, all pages share the same background color, but the color of the text matches the color bar on the side. Color-coding is applied between the body text and decorative bar on the left or right side of each menu page. The menu uses a different colored bar for each page to help group information.

**Image and Graphic Punctuations**

Images are used on the Stacked printed-paper menu as stop power, and they take about one fifth or one fourth of each menu page. There are approximately ten menu items on each panel, but there is only one photographs presented. Usually there is only one large image per page, which is used more like a decoration rather than visual assistants and explanations of their food items.

As it is shown in Table 5, Stacked’s Paper Menu got a similar score comparing to the Cheesecake Factory’s Paper Menu. This content on the menu is limited and cannot fulfill diners’ needs. Typography and colors need to be adjusted for better legibility. Layout needs to be redesigned and information should be reorganized to provide a logic sequence for
diners. Using images on a large portion will help diners to obtain the information more quickly and easily. As a conclusion, Stacked’s Paper menu design got a score of 13, which presents a fair menu, not an excellent one.

Table 5. Evaluation of Stacked’s Paper Menu

<table>
<thead>
<tr>
<th></th>
<th>Stacked</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Information Content</strong></td>
<td></td>
</tr>
<tr>
<td>Quantity of Content</td>
<td>1</td>
</tr>
<tr>
<td>Levels of Content</td>
<td>1</td>
</tr>
<tr>
<td>Attitude of Content</td>
<td>1</td>
</tr>
<tr>
<td><strong>Typography</strong></td>
<td></td>
</tr>
<tr>
<td>Personality</td>
<td>1</td>
</tr>
<tr>
<td>Legibility</td>
<td>1</td>
</tr>
<tr>
<td>Harmony and Consistency</td>
<td>2</td>
</tr>
<tr>
<td><strong>Color</strong></td>
<td></td>
</tr>
<tr>
<td>Color Harmony</td>
<td>1</td>
</tr>
<tr>
<td>Color Contrast</td>
<td>0</td>
</tr>
<tr>
<td>Color Impact</td>
<td>1</td>
</tr>
<tr>
<td>Color-coding</td>
<td>2</td>
</tr>
<tr>
<td><strong>Layout and Hierarchy</strong></td>
<td></td>
</tr>
<tr>
<td>Layout</td>
<td>1</td>
</tr>
<tr>
<td>Columns</td>
<td>0</td>
</tr>
<tr>
<td>Entry Points</td>
<td>0</td>
</tr>
<tr>
<td>Organization</td>
<td>0</td>
</tr>
<tr>
<td><strong>Images and Graphic elements</strong></td>
<td></td>
</tr>
<tr>
<td>Image setting</td>
<td>1</td>
</tr>
<tr>
<td>Clarity</td>
<td>0</td>
</tr>
<tr>
<td>Graphic elements setting</td>
<td>0</td>
</tr>
<tr>
<td>Legibility</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>13</td>
</tr>
</tbody>
</table>
Digital Menu

Figure 27. Stacked’s Digital Menu

Figure 28. Stacked Digital Menu Gesture
Navigation

Stacked’s digital menu is designed for a landscape orientation only (Figure 27). It is set on the table and cannot be moved by consumers. As shown in the figures in Image 31, there is a lot of wasted space on the screen, and food item descriptions only take about three lines, which is only one third of the reserved screen area. White space becomes dead space instead of negative space that interacts with the rest the menus’ parts.

Using medium grey and plain white separately as background colors to differentiate food items makes information present more clearly. The categories are on the right side of the screen and the one that consumers are looking at is highlighted in dark brown (Figure 28,29). On the main screen of the menu all food items are divided into 11 sections, including beverages, beer and wines, appetizers, salads and soups, fries, sides and sauces, burgers, pizza, stacked mac, shakers and desserts, kid creations, and gift cards. Guests need to select one of these categories and move to the next step and scroll down to find all of the categories that they can read. In order to enhance brand identity and have better consistency, similar typefaces are used for both the paper menu and the digital menu. In comparison to Stacked’s
printed menu, the digital menu focuses on helping guests to customize their own dishes by adding or removing ingredients and on deciding their own flavor.

Consumers have enough space for tapping and dragging graphic items due to the large button sizes and other tags. Research and studies show that customers do not like fully self-service restaurants because being served by people is one of the main reasons that people dine out, especially for casual dining and fine dining restaurants, service is one of the key components.

Compared to its paper menu, Stacked’s iPad menu uses more images as visual assistants to help communicate with guests. Because of its choice of background color, it has much better contrast and better legibility.

As it is shown in Table 6, Stacked’s Digital Menu delivers the message appropriately. Unlike its paper menu, the digital menu sets typography and images on a large scale, which helps to communicate with diners more effectively. Layouts could be redesigned to fulfill the space on the screen, and color-coding should be used for consistency. More detailed feedbacks need to be provided for better user experience. In general, Stacked’s Digital menu is rated as a good menu with the score of 27.
Table 6. Evaluation of Stacked’s Digital Menu

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Stacked’s Digital Menu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information Content</td>
<td>Quantity of Content</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Levels of Content</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Attitude of Content</td>
<td>1</td>
</tr>
<tr>
<td>Typography</td>
<td>Personality</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Legibility</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Harmony and Consistency</td>
<td>1</td>
</tr>
<tr>
<td>Color</td>
<td>Color Harmony</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Color Contrast</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Color Impact</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Color-coding</td>
<td>1</td>
</tr>
<tr>
<td>Layout and Hierarchy</td>
<td>Layout</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Columns</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Entry Points</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Organization</td>
<td>1</td>
</tr>
<tr>
<td>Images and Graphic elements</td>
<td>Image setting</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Clarity</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Graphic elements setting</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Legibility</td>
<td>0</td>
</tr>
<tr>
<td>Usability</td>
<td>Target size</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Visual cues</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Navigation controls</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Feedback</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Customization</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>27</strong></td>
</tr>
</tbody>
</table>
3.2.4 Visual Analysis 4: Carmel Café

Carmel Café is a Modern Mediterranean casual-dining restaurant chain located in Florida, serving friends and families in a relaxed atmosphere.

Figure 30. Carmel Café Exterior

Figure 31. Carmel Café Interior

Red is used in a large portion of both the interior and exterior design of Carmel Café. Dark blue glass is used to balance the warmth created by the brown and red (Figure 30, 31).
Figure 32. Carmel Café Paper Menu: Lunch
Physical Format

The Carmel Café paper menus (Figure 32, 33) have three separate single-panel pages in total, including one page for brunch, one page for lunch, and one page for dinner. All paper menus share the same height but due to the different amount of food items displayed on each page, they have different widths. The menu is lean and designed in a portrait orientation as usual.
Typography

The general typography of Carmel Café marketing provides a modern, clean and energetic feel to consumers. All text on the menu pages (Image 34) is tall and skinny due to the use of a condensed typeface. Condensed typefaces are not designed for large amounts of
content and this specific condensed typeface does not provide good readability due to its pointy features, which are not friendly or inviting to consumers at all. The situation becomes even worse when italic and condensed styles are used together for one body copy. The proportion is awkward and reduces readability. The rigid layout, which is used here, makes the typography lack vitality and variations. Prices are right aligned, which is too easy for consumers to compare. The line length is about 10 words, which is appropriate for diner to read.

**Color**

All headings on Carmel Café’s printed menu are in the color orange, which matches the color of its logo design. Orange is considered as the hottest of all colors in terms of temperature, and it is associated with glowing and vital. Therefore, it is widely used in the food industry, and the playful and happy features make it inviting and friendly. The color choices do create good contrast between the dark brown text and the plain white background.

**Image and Graphic Punctuations**

The primary goal of the menu is to communicate with consumers. Studies and research show that with the help of images and graphic marks, customers will receive and interpret the message more easily and quickly. There are no images used on Carmel Café’s printed menu. Little yellow flowers communicate the meaning of “new seasonal menu”, but it would work better if all the text is aligned to the left, and those little flowers are all in a separate column, in front of the entire text block.
As it is shown on Table 7, The Camel Café’s paper menu provides plenty of information on very limited space. More negative space could be added to group different information. Typefaces, type sizes and weights need to be adjusted to improve legibility. Images and graphic punctuations could be added to make the information easier to understand. The Camel Café’s paper menu is rated as a fair design with the score of 15.

<table>
<thead>
<tr>
<th>Table 7. Evaluation of Carmel Café’s Paper Menu</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Information Content</td>
</tr>
<tr>
<td>Quantity of Content</td>
</tr>
<tr>
<td>Levels of Content</td>
</tr>
<tr>
<td>Attitude of Content</td>
</tr>
<tr>
<td>Typography</td>
</tr>
<tr>
<td>Personality</td>
</tr>
<tr>
<td>Legibility</td>
</tr>
<tr>
<td>Harmony and Consistency</td>
</tr>
<tr>
<td>Color</td>
</tr>
<tr>
<td>Color Harmony</td>
</tr>
<tr>
<td>Color Contrast</td>
</tr>
<tr>
<td>Color Impact</td>
</tr>
<tr>
<td>Color-coding</td>
</tr>
<tr>
<td>Layout and Hierarchy</td>
</tr>
<tr>
<td>Layout</td>
</tr>
<tr>
<td>Columns</td>
</tr>
<tr>
<td>Entry Points</td>
</tr>
<tr>
<td>Organization</td>
</tr>
<tr>
<td>Images and Graphic elements</td>
</tr>
<tr>
<td>Image setting</td>
</tr>
<tr>
<td>Clarity</td>
</tr>
<tr>
<td>Graphic elements setting</td>
</tr>
<tr>
<td>Legibility</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>
Unlike the Stacked’s digital menu, Carmel Café uses a portrait orientation (Figure 35), the same as their printed menu. Like its printed menu, the headings on each page of the Carmel Café menu are also in orange, and the buttons are in the same color but different tints. Because of the small size of the button “add”, the word “add” should be placed in the center of the rectangular-shaped button. There is a status bar on the bottom to indicate how many pages in total are in the menu, and users should swipe the pages to look for more information. In the pop up window, all ingredients are shown in a lightweight grey text, and no further description is provided.
Layout

Carmel Café’s digital menu uses a grid system, and all food items are equally divided into two columns. When customers tap the magnifying glass icon on the lower right corner of each food item, the system will show a pop up window, with detailed information of the dish (Figure 36, 37). The magnifying glass icon may be confusing to some guests if they are familiar with the default search icon on most existing web browsers and other systems, which also uses a
magnifying glass. The orange add button has a 3D effect to make it clear to consumers that the button is clickable.

**Color**

The color choice made the navigation button has a low contrast with the wood background. There are usually six items displayed on each screen, and they are arranged based on a very basic grid system with two columns. If there are more items in this category, guests can scroll down the menu page to see the rest of items. According to the research about chunk, six is a good number of items to display on each page, because guests tend to forget what they have read if there are more than ten items.

**Navigation**

The navigation bar is located on the top of each screen. Due to its consistent location, customers do not need search for it, so it reduces the memory load for them. Portrait orientation is easier for guests to hold with just one hand, in comparison to landscape orientation. Because Carmel Cafe does not offer any navigation for customers as Stacked does, portrait orientation is more stable when used. The magnifying glass icon uses a grey background, which does not have enough contrast with the image layers. When there is a pop up window shown on the screen, the rest of the screen is darkened, which helps consumers to concentrate on the foreground instead of the background.
Usage of space

The basic grid system used in the Carmel Café digital menu is clean and functional, which makes the design for the entire menu very consistent, but it also makes it too rigid and lacks variations. For most screens, the Carmel Café digital menu does not use space very efficiently. Plenty of white space borders food items (Figure 38). White margins and gutters divide one page into different sections, but at the same time, it is a waste of space and creates visual clutter for guests. White space should be quiet and in the background, not distracting. When too much white space and too many boarders are left visual clutter is created. No special graphic punctuation is used to differentiate food items.
In general, Carmel Café has a better digital menu design compared to Stacked, although Stacked’s paper menu design works better than Carmel Café’s.

As it is shown in Table 8, Camel Café’s digital menu got a score of 25 and is rated as a good design. Detailed information needs to be added to the menu to fulfill diners’ needs and the layout needs to take advantages of the space on each screen. Color scheme could be reconsidered for better contrast and compact. The interface should be customizable so diners will determine what kind of information they want to know.

<table>
<thead>
<tr>
<th>Table 8. Evaluation of Camel Café’s Digital Menu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information Content</td>
</tr>
<tr>
<td>Quantity of Content</td>
</tr>
<tr>
<td>Levels of Content</td>
</tr>
<tr>
<td>Attitude of Content</td>
</tr>
<tr>
<td>Typography</td>
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<td></td>
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<td></td>
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<tr>
<td>Color</td>
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<tr>
<td></td>
</tr>
<tr>
<td>Layout and Hierarchy</td>
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<tr>
<td></td>
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<td></td>
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<tr>
<td></td>
</tr>
<tr>
<td>Images and Graphic elements</td>
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<td></td>
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<tr>
<td></td>
</tr>
<tr>
<td>Usability</td>
</tr>
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<td></td>
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<tr>
<td></td>
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<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>
3.2.5 Summary of Evaluation

Applebee’s and The Cheesecake Factory menus represent two major ways of menu design of casual dining restaurant: image dominates and text only. None of these four restaurants have a paper menu nor a digital menu that is rated as an optimal menu design according to the evaluation criteria due to how information are visually presented on either paper or the digital screen considering legibility and readability.

The final scores for paper menu design are Applebee’s-24, the Cheesecake Factory-10, Stacked-12, and Carmel Café -15. The final scores of the digital menus are Stacked-27 and Carmel Café-25.
CHAPTER 4. THE PROTOTYPE DESIGN AND EVALUATION OF APPLEBEE’S DIGITAL MENU

The prototype was designed to provide a simple yet effective solution to next generation’s restaurants digital menu design for the popular casual dining restaurant chain Applebee’s. The prototype is shown as several screenshots here.

4.1 The Prototype

Evaluation matrix from last chapter was used as design guidelines and structure skeleton to assist meeting the needs of diners in terms of customization and personalization, making the information more convenient and accessible to users, especially for those who do not have much experience using digital tablet like iPad and others.
Figure 39. Welcome Screen of Applebee’s Digital Menu Prototype
Figure 40. Order Screen of Applebee’s Digital Menu Prototype
Figure 41. Dish Details of Applebee’s Digital Menu Prototype
4.2 Evaluation

The prototype was designed to provide a simple yet effective solution to next generation’s restaurants digital menu design for the popular casual dining restaurant chain Applebee’s. The prototype is shown as several screenshots here.

The welcome page design (Figure 39) used pictures to help use to different, especially for aging eyes and viewers whose native languages are not English. The basic three columns grid structure is applied consistently to all user interfaces.

A white background (Figure 39, 40 and 41) is used for the design prototype for a clean and clear view for better contrast and better legibility as well as readability. Proportional images are used as stop motion and promotions to draw people’s attention and sell items. A clear and simple modular grid system is applied to the prototype, and typefaces are and different styles are carefully chosen to build hierarchy as well as harmony from the combination. Color scheme is based on the interior and exterior of the restaurant, as well as it to make it friendly and engaging for diners in order to enhance brand identity, also provide better contrast for diners with visual difficulties such as color blindness and aging eyes. Some diners want to know the accurate nutritional information and values about the food items on the menu and the freshness of ingredients as well. And detailed information is presented on the single food item page. Usability is the key component in this interface design. They can measure all nutritional features such as calorie, salt, and as well as flavor. Customization in digital menu including changing the contrast on the screen based on different times of the day when glare and illumination could be issues for legibility and readability.
As it is shown in Table 9, the prototype design of Applebee’s digital Menu is clear, rated as an excellent digital menu design. The prototype in general meets the criteria from the evaluation matrix. It has different level of content to fulfill diners’ needs and the typography provides good legibility and consistency. The color choices are associated with the brand identity, which provides harmony and contrast. The layout is clear and consistent, providing good information hierarchy to guide diners to go through the organized information. Images and graphic elements are set in appropriate quality for communication. Navigation is consistent and feedbacks are provided to diners for better user experience.

Table 9. Evaluation of the Prototype Design: Applebee’s’ Digital Menu

<table>
<thead>
<tr>
<th>Information Content</th>
<th>Applebee’s’ Digital Menu Prototype</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantity of Content</td>
<td>3</td>
</tr>
<tr>
<td>Levels of Content</td>
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</tr>
<tr>
<td>Attitude of Content</td>
<td>2</td>
</tr>
<tr>
<td>Personality</td>
<td>2</td>
</tr>
<tr>
<td>Legibility</td>
<td>3</td>
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<tr>
<td>Harmony and Consistency</td>
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<tr>
<td>Color Harmony</td>
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<tr>
<td>Color Contrast</td>
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<tr>
<td>Color Impact</td>
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<tr>
<td>Color-coding</td>
<td>3</td>
</tr>
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<td>Layout</td>
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<tr>
<td>Columns</td>
<td>2</td>
</tr>
<tr>
<td>Entry Points</td>
<td>2</td>
</tr>
<tr>
<td>Organization</td>
<td>2</td>
</tr>
<tr>
<td>Image setting</td>
<td>2</td>
</tr>
<tr>
<td>Clarity</td>
<td>2</td>
</tr>
<tr>
<td>Graphic elements setting</td>
<td>2</td>
</tr>
<tr>
<td>Legibility</td>
<td>2</td>
</tr>
<tr>
<td>Target size</td>
<td>3</td>
</tr>
<tr>
<td>Visual cues</td>
<td>2</td>
</tr>
<tr>
<td>Navigation controls</td>
<td>2</td>
</tr>
<tr>
<td>Feedback</td>
<td>2</td>
</tr>
<tr>
<td>Customization</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
</tr>
</tbody>
</table>
CHAPTER 5. CONCLUSION AND DISCUSSION

5.1 Conclusion

With the history of 260 years, traditional restaurant printed menu design today is moving to next generation-digital menu. Increasing numbers of restaurants especially casual dining restaurants are adapting digital menu system as their next generation’s marketing and communication tool. There is a huge demand from restaurants operators and menu designers yet there is not much research they can look into. The demand from the market and consumers is huge but the design is not mature and lacking of guidelines and great examples. Comparing to printed menu, digital menu could be a sufficient way to enhance restaurants’ brand identity and help diners to build positive attitude towards the restaurants, which will increase their brand loyalty for better benefits. In order to design excellent restaurant digital menus, designers need to follow not only the general design principles of graphic design and user interface design, but also menu phycology and menu engineering.

The purpose of this study is to build an evaluation matrix for restaurants digital menu design and using this matrix and evaluation as guidelines to create a design prototype for the popular casual dining restaurant chain Applebee’s in North America. This process began with investigating with current research and methodologies of graphic and user interface design, hospitality management and menu psychology, and the case studies analysis existing both printed menu and digital menus of popular and trendy casual dining restaurants.

The knowledge gained from this study, the evaluation matrix can be used by restaurant operators, menu designers as an evaluation tool and design guidelines, to evaluate
and created their existing paper menu and digital menu, and help operators and designers to understand the power of menu as marketing tool. Next generation of restaurant’s menu design is digital and will benefit as we learn more about.

5.2 Future Work

This evaluation matrix and prototype have not yet been tested by actual diners in Applebee’s. Usability testing could be conducted in order to gather data, explore limitations of the interface, and get feedback and suggestions for revisions. Next step will be to evaluate how diners respond to the design emotionally and provide answers about how diners like the next generation’s digital menu design, and how diners from different age groups and culture background, and with different experience using will respond to the design in terms of usability and emotional effect. And it is also worth testing that whether digital menu could be adopted by other kind of restaurants successfully such as fine dining restaurants. Other interaction features could be added like entertainment and customers rating system, which could be linked to social network such as Facebook and Twitter, and also more personalization features like setting up personal account and diet records, saving personal preferences for regular customers.
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