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Identifying an Optimal Dining Plan System for the Entertainment Industry

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by
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Abstract

The Disney Dining Plan (DDP) is a pre-paid meal plan guests can purchase when they make their reservation at Walt Disney World (WDW). Under the current system, the information provided to guests explaining the program is unclear which leads to confusion for guests. For example, guests are not sure what food they can purchase using the DDP or at which dining locations they can use the DDP. Given these problems, the present study evaluated a new information system for the DDP. The independent variables in this study were symbol type, the symbols used in the current DDP and new symbols created for this study, and system type, the current paper-based system and an electronic, integrated system.

Participants (N = 44) were randomly assigned to one of four conditions (old symbols-paper system, new symbols-paper system, old symbols-electronic system, and new symbols-electronic system). After reviewing the DDP, participants then completed a series of tasks including scenario-based task, a multiple-choice test based on the DDP, a symbol discriminability measure, and a measure of system usability (System Usability Scale [SUS]). In addition, participants provided open-ended feedback to the researcher about their experience with the system.

Results indicated no significant difference between the type of symbols used and the amount of time it took to complete the scenario, the amount of time it took to complete the questionnaire, accuracy on the symbol discriminability task, or the overall system usability scale (SUS) score. However, significant differences were found between the type of symbol used and the accuracy and confidence rating of varying symbols in the symbol discriminability task. Furthermore, there was a significant main effect for system type with participants using the electronic system taking longer to complete the questionnaire.

Although results showed that it took participants significantly longer to answer the questions during the multiple-choice task, there are factors that could have a played a role; scanning-time, click-throughs and motivation. Participants in the paper-based group were able to scan over a list of all the dining locations whereas participants in the electronic version were forced to click through multiple screens to view various dining locations. This test, however, does not accurately represent how the electronic application would be used but it did demonstrate that participants were able to answer the DDP questionnaire regardless of system. In the field, guests would most likely access one theme park or resort and view the various dining locations in the area they are in. This study forced participants to constantly switch between theme parks and resorts. If participants were also in a theme-park environment, they may also be more motivated to use the application.

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Introduction

Walt Disney World (WDW) is one of the most popular travel destinations in the world, accommodating millions of guests each year. Consisting of over 40,000 acres, there are numerous locations for guests to dine at WDW. WDW developed the Disney Dining Plan (DDP) to make dining an easy and effortless experience for the guests. However, the system is relatively complicated and can be difficult for first-time users to figure out. Furthermore, although all of the information pertaining to the DDP is available to guests, it is not all located in one place which also complicates understanding. This presents a challenge to users because any information they are missing from the DDP could reduce their understanding of how the DDP works.

Currently, guests can gather information about the DDP from PDF files online, conversations with Disney Cast Members (a term used to describe all Disney customer service employees), as well as a brochure presented to guests checking in at a Disney resort. If a guest arrives at WDW and only receives the pamphlet of information about the DDP, it would be very challenging for the guest to use and understand the DDP.

Given the complexity of the DDP, and that much of the information is spread out in different locations or sources, this study evaluated how integrating the DDP information improves how guests understand and use the plan and if an integrated approach increases user satisfaction. In addition, this integrated approach tested the guests' ability to customize the information to that particular guest's meal plan. Furthermore, because there are multiple levels of the DDP, guests only saw information relating to the specific level of the DDP they purchased.

There have been several studies conducted on integrated information in aviation, nuclear power plants, the health care industry, and the marine industry. However, little research has

been done looking at integrated information in the entertainment industry. Also, in past research, the users of the integrated system would have been heavily trained on how to use the system, but in the theme park setting, users may only use the system a handful of times during a single vacation. This study is designed to use principles and factors developed from integrated systems in other fields to integrate information on the DDP in a theme park environment. For example, Tung (1999) conducted an exploratory study of six firms in the Singapore area looking at the implementation of information kiosks. The study concluded that, "Most of the orgnanisations interviewed have cited that one main objective of implementing kiosks is to enhance their customer service" (p. 248). Having kiosks available for guests to use at WDW increases the potential for guests to gain a better understanding of the DDP as well as increase guest satisfaction.

The Disney Dining Plan

The DDP is a pre-paid dining package available only to WDW resort guests. Guests have the option to choose from five levels of the DDP. The different levels range from The 2010 Magic Your Way Plus Quick Service Dining (which consists of two quick-service meals and two snacks per person per day) to the 2010 Magic Your Way Platinum Vacation Package (which consists of three table service (or quick service) and two snacks per person per day plus unlimited use of Disney recreation, tours, and many other features) (Disney, 2009a).

Each package is divided into four different meal options: quick-service, adult table-service, child table-service, and snacks. A quick service meal for breakfast consists of juice, an entrée or combo meal, and non-alcoholic beverage. A quick service meal for lunch/dinner consists of an entrée or combo meal, dessert, and non-alcoholic beverage. A table-service breakfast meal consists of juice, and entrée, and a non-alcoholic beverage or a full buffet. A

table service lunch/dinner meal consists of an appetizer (guests ages 3-9 only), an entrée, a non-alcoholic beverage, and a dessert or a full buffet for lunch/dinner. A snack is generally an ice-cream, popcorn, soda, coffee or several other options (Disney, 2009b).

Every dining location at WDW is categorized as a quick service, table service, character dining, signature restaurant, or dinner show. The amount of credits it would cost a person to eat at one of these locations would depend on the type of package they have purchased. For example, if a family purchased the lowest level DDP that includes table service it would cost them two table service credits per person to eat at a signature restaurant, where it would cost a family who purchased the highest level DDP with table service one credit per person to eat at the same location. The restaurants available to guests also varies based on the dining plan they have purchased.

This study uses the 2010 Magic Your Way Vacation Package Plus Dining as the example dining plan for the entire study. This is the dining option Disney recommends for guests to purchase. This package consists of one table service, one quick service, and one snack per person per day. As evidenced by the complexity of the DDP, any integrated display will need to have a high degree of usability to be successful and not increase confusion for Disney guests.

Usability

Usability is defined in the International Organization for Standardization (ISO) (1998) as, "the extent to which a product can be used by specified users to achieve goals with effectiveness, efficiency and satisfaction in a specified context of use" (p. 6). As the information on the DDP is integrated into one system, it is critical that the system be usable without any training to accommodate first-time users.

As noted by Baber (2005), usability can be difficult to measure:

> "The International Standards specify the need to measure aspects of usability, and provide an indication of what to measure, but they leave the precise definition of usability to the evaluator. This is primarily because, unlike physical measurements such as length or weight of voltage, the application and interpretation of the measure will vary according to the context of use. This inevitably makes the idea of a standard measure of 'usability' highly problematic" (p. 360).

Because there is no one set way to measure usability, and measures vary from study to study, usability measurements for the current study was customized to measure specific attributes of the DDP.

Several authors have described key factors or elements in usability. For example, Seffah, Donyaee, and Kline (2006) identify 10 factors: efficiency, effectiveness, productivity, satisfaction, learnability, safety, trustfulness, accessibility, universality, and usefulness. A more expansive list is offered by Baber (2005) with 34 separate factors. Of those 34 factors, 6 were consistent with Seffah, Donyaee, and Kline (2006). These overlapping factors were efficiency, effectiveness, satisfaction, learnability, safety, and productivity. Furthermore, of these six factors, three are consistent with the ISO (1998) 9241-11: effectiveness, efficiency, and satisfaction. Because these three factors are consistent across these works, they will serve as the primary measures of usability in the current study.

In this review of usability research related to information integration, and how to conduct usability evaluations on displays, several studies offer insight. For example, Nielsen and Molich (1990) measured usability using a heuristic evaluation, or, as they describe, "… looking at an interface and trying to come up with an opinion about what is good and bad about the interface" (p. 249). In their study, participants rated four different interfaces. Of the four interfaces, the

least amount of errors detected was 20% and the most amount of errors detected was 51%. Although these numbers seem high, Nielsen and Molich note that the numbers are not all that bad. They conclude that when conducting a heuristic evaluation, several participants should evaluate the system, but work independently of each other and not in groups. "We recommend that heuristic evaluation is done with between three and five evaluators and that any additional resources are spent on alternative methods of evaluation" (p. 255). In the present study, participants will conduct a heuristic evaluation of the new system after they have interacted with it.

Molich and Nielsen (1990) also define a short checklist composed of nine principles that should be taken into consideration when defining usability heuristics: 1) simple and natural dialogue, 2) speak the user's language, 3) minimize the user's memory load, 4) be consistent, 5) provide feedback, 6) provide clearly marked exists, 7) provide shortcuts, 8) provide good error messages, and 9) provide error prevention. The present study uses these nine principles as the basis for how participants evaluate the new integrated system.

With regard to research on information displays, Carstens and Patterson (2005) conducted a study looking at the usability of three travel websites. This was the first part of a four-part study, and they were looking to determine characteristics that should be present in all travel websites. They used 20 participants ranging in age from 19-65. The participants were asked to complete a series of tasks on each travel website and then complete a post-survey to determine usability. The post survey consisted of both closed- and open-ended questions. The close-ended questions targeted more physical features of the website (i.e., color, page layout, layout of flight information, font, and the ease of using the website). The open-ended questions gave participants the opportunity to describe each website and recommendations for

improvement. When measuring usability for the DDP on the new system, participants also have the opportunity to complete a post-survey, consisting of both closed and open-ended questions.

As described previously, the present study evaluates an electronic, integrated display for the DDP information to improve on the current paper-based approach. A similar study by Rodriguez, Murillo, Borges, Ortiz and Sands (2002) evaluated the usability of a paper-based patient record system and an electronic patient record system used by physicians. In their study the researchers assessed the usability of converting paper records into electronic records. There were a total of 36 participants ranging from 1.7-2.2 years of resident physician experience. The participants were asked to complete a series of tasks using both systems and asked to complete a subjective user satisfaction questionnaire for each system. Results indicated participants took significantly less time to view the electronic-based system than the paper-based system and were more satisfied with the electronic-based system. This study is very similar to the present study in that the DDP paper-based system is being transitioned into an electronic-based system. Rodriguez et al. show that electronic-based systems can improve user satisfaction over paper-based systems.

Website Design

The setup of the new integrated electronic display system was critical to the performance of the user. A study comparing the structures of websites in the United States and the Netherlands showed users preferred the "tree structure with a return-to-home page button," (Huizingh, 2000, p. 125) over other structures (i.e., tree structure, few horizontal links, or network structure). The DDP electronic system has been modeled after this structure. The setup had a home page, with a return-to-home page link on each page, and every other page was under the home page in a tree structure.

When creating a website, Troyer and Leune (1998) describe the process as a series of phases that include user modeling, conceptual design, implementation, design, and implementation. Troyer and Leune further define user modeling as the time to learn about the users and what they need in the new website, to find out what questions they have and how they will be answered. This has already been completed in a previous study on the DDP (Crimi, 2009). In that study, participants (N = 12) were given a park map and the DDP brochure. They were given a brief overview of the DDP and how it works followed by a series of questions. Participants were also asked to report any parts of the DDP that they did not understand. Results of this study revealed that participants reported:

- there was too much information
- they did not understand what the term snack meant
- they did not understand why there are different table service options (i.e., table service, character dining, signature dining, private in room dining, and dinner shows) but all had the same label
- they did not know character dining was included on the DDP
- they did not know that not every dining location was on the DDP
- they did not understand they were allowed to dine at resorts other than their residence resort they wanted to know the types of food at dining locations

Each of these issues has been addressed in the development of the new DDP system.

In another research study relevant to the present study, Mehlenbacher, Duffy, and Palmer (1989) had participants locate items in a menu on a computer where the menu was manipulated to be alphabetical or by category. Results indicated participants who were not very familiar with the system were able to locate items faster when the menu was organized into categories rather

than list every item alphabetically. Accordingly, the DDP electronic system organized dining locations into categories rather than listing them alphabetically.

Integration of Information

Integrating information is a key aspect to the premise of this study. The current PDF file Disney offers to guests clearly defines and explains how to use the DDP as well as listing locations that are on the DDP. However, the PDF file does not integrate other aspects of the DDP which include, but are not limited to, credit balance, park maps and current reservations. A study conducted by Smith and Simon (2009) showed, "data integration systems are associated with greater information availability. In turn, greater information availability increases strategic decision correctness" (p.41). The employees tested were able to make better decisions in certain circumstances when the necessary information they needed to make the decisions was integrated together.

Some examples of these consequences from the lack of integrated information can be seen in examples from the nuclear power, maritime, aviation, and medical domains. For example Kletz (2001) reports some causes of the Three-Mile Island nuclear accident. Kletz reports that the operators in the control room thought a particular valve was closed, when in reality it was stuck open. He continues to say there were hundreds of alarms going off and some instruments were misleading. With many alarms going off and different readings at different ends of the control room, it was very difficult for the operators to determine the cause of the problem. Since then, nuclear control rooms have undergone significant changes. Boring (2009) reports, "Operators have alarm systems and symptom oriented emergency operating procedures that guide them through plant upsets." Safety systems now integrate all the necessary information an operator needs to correct a problem and leads the operator on how to solve the

problem. This is a large change from hundreds of alarms going off at one time alerting the operators of many situations.

Mills (2006) discusses how integrating information in marine electronic systems could increase safety and awareness for fisherman. She refers to an incident in the United Kingdom in 2004 where several fishermen lost their lives due to marine accidents. "Clearly, if the navigation screen integrates the radar with the chart, then an alarm should be incorporated into the system so that the presence of vessels within the guard zone are identified to the user by the alarm so that the user can take action to prevent collision" (p. 432). This safety issue only highlights the importance of integrating information.

While these extreme examples illustrate the need for integrated information, the method of that integration can be seen through design guidelines and other, less extreme, examples. Mills (1998) defines six principles that should be followed: 1) the analysis of the decision task domain should inform the grouping of information (i.e., group information the same way a user would group information), 2) the configuration in familiar tasks should relate to the users previous knowledge (i.e., use the same information the user is already familiar with), 3) task assignment between user and computer should optimize the inherent characteristics of each (i.e., allow the computer to perform tasks the user does not need to and only present relevant information to the user), 4) functional integration should be exploited through automation of transfer of information (i.e., integrate necessary information into one display rather than multiple displays), 5) task sequences should be completed on one display unit (i.e., have the user perform necessary tasks on a single display rather than multiple displays), and 6) confusion between similar but different information must be avoided (i.e., similar but different information should be presented apart

from each other rather than together). Each of these principles has been incorporated into the design of the electronic display.

An example of how integrated information could have been helpful in a situation was demonstrated in American Airlines flight 965. As the pilots were preparing to land in Cali, Columbia, they set the automated computed to fly a specific flight path, however the pilot entered the incorrect path. Once the pilots realized they were headed in the wrong direction, they began to correct for their mistake to align the Boeing 757 with the runway. During all these maneuvers, the aircraft had been steadily descending to the appropriate altitude. Not too long after correcting their mistake, the ground proximity warning system was activated, and 13 seconds later the aircraft crashed. The flight management system (FMS), which is responsible for aircraft heading, does not incorporate the terrain in the surrounding area of the aircraft; it simply directs the aircraft to line up with the designated heading entered by the pilots. If the FMS display incorporated the terrain of the surrounding area into the display, the pilots could have been made aware of the developing problem. Although there were several causes for the crash of American Airlines flight 965 in Cali, Columbia, Endlsey and Strauch (1997) report one of the major causes was that, "FMS displays need to provide the required information in a single integrated format. We cannot rely on pilots to integrate multiple, sometimes dissonant sets of information in time-critical, high stress situations" (p. 5).

Another study demonstrates how integration information on a kiosk was able to give users the information they were seeking. Nicholas, Huntington, Williams, and Vickery (2001) evaluated if the information on a touch-screen kiosk was able to answer the user's questions, and after using the kiosk, would the user seek additional information somewhere else. The kiosks were located at two hospitals in the United Kingdom. An exit-poll questionnaire was given to

users by staff members just after they used the kiosk. There were 174 questionnaires completed by males and females ranging from 16 years of age to 75 years of age. The results indicated that 79% of users found the information easy to read, 90% found it easy to find the topic they were searching for, and 88% found the kiosk easy to understand. About two-thirds of the users thought the information they found answered their question. Results also indicate 57% of the users did not have additional questions after using the kiosk, while 28% of the users did. This study did not look to see if the 28% of users who had additional questions were seeking additional information because their original question was not answered or because the information they did find lead them to more questions.

In the aviation domain, Ververs, Dorneich, Good, and Downs (2002) conducted a study on 12 commercial pilots, with a mean of 10,700 flight hours, to evaluate the Alerting and Notification of Conditions Outside the Aircraft (ANCOA) system. The ANCOA system integrates the separate warnings systems (ground proximity warning system, traffic collision and avoidance system, reactive windshear, etc.) into one system. This system will integrate, "multiple alerts of external conditions to be prioritized and de-conflicted before being presented to the flight crew" (Ververs et al., 2002, p. 11). The purpose of the study was to study pilot performance when using the integrated display vs. the normal separate displays. Pilots reported having a significantly higher workload using the separate displays rather than using the integrated display; pilots using the separate displays reported having to press more buttons and refer to multiple displays increased their frustration when using the separate displays. The study showed that pilots had a lower workload and less frustration when the separate systems were integrated together.

Since the DDP is used in a theme park environment, the new integrated system is modeled similar to a kiosk. In one study, researchers sought to determine the overall impression of a new kiosk (Liu & Wheat, 1995). Participants were asked to interact with the system as long as they desired (average time 19.25 minutes). Upon completion, participants were given a survey questionnaire to record demographic information, a 15-point item list using a 5-point Likert scale, as well as answering open-ended questions. The most popular pages viewed on the system were campus maps, bus schedules, the history of the college, and financial aid information. The average score of the system was 3.97 and the ratings of first-time users were consistently higher than other users. . The DDP system will include things like dining locations on park maps, account information, and detailed information tailored to each guests DDP.

Although little research is available as to the actual design of applications used in the entertainment industry, research is available supporting the need for more highly advanced integrated systems. Buhalis (1998) explains that newer systems are needed to "enable travelers to access reliable and accurate information as well as to undertake reservations in a fraction of the time, cost and inconvenience required by conventional methods," (p. 411). Buhalis (1997) continues to explain how destinations benefit from destination specific management systems. Integrated systems are needed to meet to the demands of the avid traveler in today's world.

Symbol Discriminability

Using the appropriate symbols to discriminate between the different levels of the DDP is important in helping the users understand the system. Currently one symbol in the theme parks to represents the entire DDP (see Figure 1), which makes it difficult for users to distinguish between the varying levels. Geiselman and Christen (1982) point out that:

Figure 1: DDP Current Symbol

"In choosing a candidate symbol to represent a particular concept, at least two factors must be considered: (1) the meaningfulness of the symbol, that is, how well the symbol portrays its referent; and (2) the discriminability of the symbol, as reflected in the speed and accuracy of detecting and/or identifying the form in the context of the existing symbol domain" (p. 329).

Currently there is one symbol that represents the entire DDP system, giving the single symbol too much to represent. This makes it difficult for users of the system to distinguish between a snack, quick-service and table-service option. This study will incorporate similar but separate symbols to represent each level (see Figure 2).

Generic Symbol

Quick Service

Table Service

Character Dining

Snack Symbol

Figure 2: DDP Symbols

Yeh and Chandra (2004) report that there are certain criteria symbols should meet to be usable. Symbols should be easy to find, distinctive from other symbols, an appropriate size, and give the user the ability to decode the attributes of the symbol quickly and accurately. They report a symbol is easy to find when it is not within a cluttered background, noting "the time it takes to find a target symbol increases linearly with increases in local and/or global density," (p. 2). "A symbol…is distinctive if it is easy to discriminate from other symbols, even if it differs from other symbols by only one feature" (p. 3). "The minimum size at which a symbol is presented must preserve the key features that define it" (p. 5). "Symbols may be integrated so that one symbol will have multiple attributes that encode information about the object," (p. 6). Each of these four factors was weighed heavily in the development of the new symbols for the DDP system. Currently the DDP symbol is only located on select boards throughout the parks in select dining locations. This already presents a problem with the first criteria, because with many locations to dine in any given theme park, the only way a user would know if a dining location was on the DDP would be to walk in every location and look for the symbol on the menu board. This study will determine if performance and user satisfaction is increased by having the current symbol used for the DDP is on park maps to designate DDP locations and having the new symbols next to each item on the menu boards to designate the appropriate DDP option.

When designing symbols, Kopala (1979) examined if color-coded symbols could reduce response time in a highly dense simulation display. The independent variables in the Kopala study were density level (10, 20, or 30), shape coded symbols, and color and shape symbols. Participants were pilots and used a cathode ray tube display in a flight simulator. The study determined that response time did increase as density level increased, but response time was

faster when participants were using color and shape coded symbols versus just shape coded symbols. The pilots were also asked to rate the usefulness of the real-time-threat symbology on a five-point Likert scale. The results showed the color display was significant compared to the just shape coded symbols. The symbols used in the new DDP system are color and shape coded to help reduce confusion for guests.

Collins and Lerner (1982) conducted a study on symbol meaningfulness and symbol production. The meaningfulness of the symbol was defined as to how well the symbol conveyed the intended message. The symbol production was defined as the types of images participants portrayed from the message of the symbol. Meaningfulness of symbols was measured by two parts: having participants write out what the symbol meant and having them select the meaning of the symbol from multiple choices along with a confidence rating. There were 91 participants in this study (male and female) ranging in age from 18-63. The study showed that the way the symbols were presented (place cards, slides, or booklets) did not affect the meaning of the symbols to the participants. There were also strengths and weaknesses found in both the multiple choice answering and the written definition answering. The multiple choice answering was thought to make participants guess what the symbol meant if they did not know, but to mitigate for that, participants had the option to rate how confident they were in their multiple choice answer with a confidence rating. However, there was a general agreement using either method of measurement for meaningfulness. The same methods were used in the current study. To determine the participant's meaningfulness of the DDP symbols, participants were asked to write out what each symbol means and complete a confidence rating scale to rate the confidence of their answer.

Remington and Williams (1986) found that graphic symbols that had numerical symbols attached increased reaction time. Sixteen participants were shown a symbol, then shown a series of paired symbols, and then asked to identify if the original symbol was present. Results indicate that the group of participants asked to identify numeric symbols performed significantly better (than the group of participants who were just asked to identify graphic symbols. Alphanumeric symbols were added to each distinct level of the DDP to help users distinguish between levels rather than the current uniform graphic symbol in place.

Although the primary focus of this study is to integrate as much information together as possible, it would still be necessary to have four separate symbols. The four symbols used in this study will only differ by color, a picture and two letters; the generic setup and design of the symbol will remain consistent. The reason this is done is because one symbol cannot represent every level of the DDP. Separate symbols must be used to show where the DDP is accepted on park maps (i.e., generic symbol) and distinguish between a snack, quick-service, and table-service on menu boards.

To evaluate the effectiveness and user satisfaction of these new symbols and the new integrated display, this study will test six hypotheses:

H_1: Participants who use the integrated display will report faster task completion time than participants who use the paper-based system.

H_2: Participants who use the electronic display will report a higher accuracy rating than participants who use the paper-based system.

H_3: Participants who use the electronic display will report higher levels of usability than participants who use the paper-based system.

H_4: Participants who use the new symbols will report faster task completion time than participants who use the generic current symbol.

H_5: Participants who use the new symbols will report a higher accuracy rating than participants who use the generic current symbol.

H_6: Participants who use the new symbols will report higher levels of usability than participants who use the generic current symbol.

Method

Participants

Participants were randomly selected for this study (N = 44) from a southeastern university and, using a counterbalancing approach, were assigned to one of four groups so that each group had a total of 11 participants. Participants (men = 36, women = 8) were primarily undergraduate students in the human factors and systems department at the university between the ages of 18 and 32 (18-22 = 27, 23-27 = 9, 28-32 = 4). All participants had no prior experience using the DDP.

Research Design

This study employed a 2 x 2, between-subjects design with two levels of the system factor (paper-based vs. electronic-display) and two levels of the symbol factor (current symbol vs. new symbols) (see Figure 3). The paper-based system represented the current system in place composed of the DDP brochure, park maps and PDF files, whereas the electronic display was composed of the new DDP application.

		System	
		Paper Based System	**Electronic Display System**
Symbols	**Current DDP Symbol**	Group 1 *n* = 11	Group 3 *n* = 11
	New DDP Symbols	Group 2 *n* = 11	Group 4 *n* = 11

Figure 3: Experimental Design

The study also measured several dependent variables. First, in order to determine which system allows users to better answer questions about the DDP, a series of 20 multiple-choice questions were developed (see Appendix A). Each participant had the opportunity to answer these questions and the results were compared against the different groups. A pilot study was also conducted ensuring the questions' validity.

Second, to measure the usability of both systems, the System Usability Scale (SUS) was used (see Appendix B). The SUS is a 10-question questionnaire measuring the usability of the system. An empirical evaluation has been conducted on the SUS demonstrating its validity and reliability (Bangor, Kortum, & Miller, 2008). With over 10 years of data from over 2,300 surveys in over 200 studies, the SUS has proved to be a diverse tool. Among several uses of the SUS, studies demonstrate the SUS is an acceptable tool to use when comparing different interface technologies, which is the primary goal of the DDP study.

As noted by Brooke (n.d.), "To calculate the SUS score, first sum the score contributions from each item. Each item's score contribution will range from 0 to 4. For items 1, 3, 5, 7, and 9 the score contribution is the scale position minus 1. For items 2,4,6,8 and 10, the contribution is 5 minus the scale position. Multiply the sum of the scores by 2.5 to obtain the overall value of SU" (p. 5). Higher SUS scores relate to better usability of the system.

The third dependent variable focused on the level of discriminability of the symbols. At the end of the each session, participants had the opportunity to perform a symbol discriminability task (see Appendix C. In this task, each of the four symbols were displayed to the participants consecutively and they had the opportunity to write down what the symbol means. After they wrote down what the symbol means, they then rated their response on a confidence scale.

Equipment

The materials needed to perform this study were a Microsoft Windows-based computer, Microsoft PowerPoint, the DDP new website slideshow, the DDP brochure, Disney Magic Kingdom, EPCOT, Disney's Hollywood Studios and Disney's Animal Kingdom theme park maps, and the DDP, PDF files.

Procedure

Participants were first greeted and welcomed to the study. They were then directed to read and sign the informed consent form (see Appendix D). Upon reviewing and signing the informed consent form, the participants began the study.

All participants were given a maximum of 5 minutes to interact with and become familiar with the DDP material; participants did not have to use the entire 5 minutes if they chose not to. The amount of time each participant used was recorded by the researcher.

After the participants reviewed the DDP information, they were then asked to complete a scenario (see Appendix E). Participants were able to use all the DDP materials they have to help answer the scenario. The researcher recorded the amount of time it took participants to complete the scenario.

Next, participants were asked to answer the DDP multiple-choice questions (see Appendix A). Participants were able to utilize as much time as they required to answer the

questions. The amount of time it took each participant to answer all the question was recorded by the researcher.

Upon completion of answering the DDP questionnaire, participants were then asked to complete the SUS (see Appendix B). Again, participants had as much time as they need to answer these questions.

Once participants completed the SUS, they then performed the symbol discriminability task. In this task, each of the DDP symbols were displayed for the participant simultaneously on an electronic display. The participants were asked to write down what they thought the symbol represented and then rate how confident they were in their answer (see Appendix C).

After participants completed the symbol discriminability task, they were asked to provide an evaluation the system. They utilized an open-ended dialog box to record any likes, dislikes and/or comments they had about the system. Finally, they were debriefed on the entire study including main goals and what was measured.

Results

The present study tested the effects of two independent variables on a number of dependent variables. Because some of the dependent variables were not measured on an interval or ratio scale, nonparametric statistics were used to analyze these variables. A 0.05 significance level was used for all tests.

First, a two-way multivariate analysis of variance (MANOVA) was conducted to determine the effect of the type of display (paper and electronic) and type of symbols (old and new) on the five dependent variables. A significant main effect was found on display type, Wilks's $\Lambda = 0.663$, $F(5, 36) = 3.67$, $p = 0.009$, partial $\eta^2 = 0.337$.

Analyses of variances (ANOVA) on each dependent variable were conducted as follow-up tests to the MANOVA. Levene's test for equality variance was not violated ($p > 0.05$). Results showed no significant main effect for display type or symbol type on the new composite variable based on the five dependent variables. However, results did reveal a significant main effect for display type and time to complete the questionnaire, $F(5, 36) = 3.668$, $p = 0.009$, partial $\eta^2 = 0.337$ (see Figure 4). Participants using the paper based system completed the questions significantly faster ($M = 12.42$, $SD = 5.45$) than those using the electronic system ($M = 20.31$, $SD = 6.26$). There was no main effect for type of symbols nor was there a significant interaction between system and symbols.

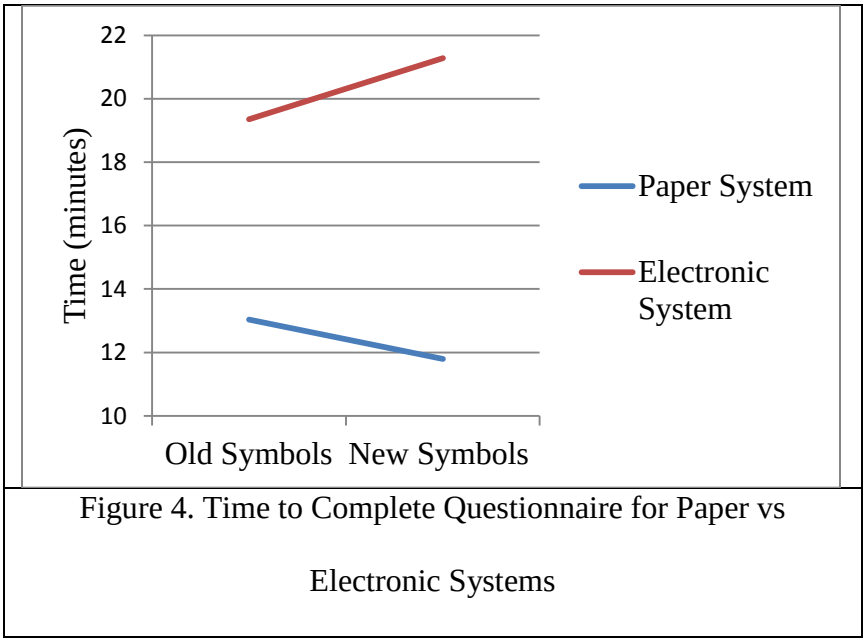


Figure 4. Time to Complete Questionnaire for Paper vs Electronic Systems

A second two-way MANOVA was then conducted to evaluate the independent variables of display and symbol type specifically for the three dependent measures related to time (review time, scenario time and question time). As before, Levene's test of equality of variance was not violated ($p > 0.05$). Results showed there was not a significant main effect for display type or symbol type on the new composite variable based on the five dependent variables. However,

results of individual analyses of variance (ANOVA) conducted on each dependent variable did reveal a significant main effect for display type and time to complete the questionnaire, $F(3, 38) = 4.32$, $p = 0.001$, partial $\eta^2 = 0.334$, and time to complete the questionnaire. Those who used the electronic system required significantly more time ($M = 12.42$, $SD = 5.45$) than the participants who used the paper based version ($M = 20.31$, $SD = 6.26$). There was no significant main effect of type of symbol or interaction between system and symbols.

Third, a series of nonparametric tests were conducted to measure the type of system being used and using the correct amount of credits on an ordinal scale. A Mann-Whitney *U* test was used to evaluate the hypothesis that participants using the electronic system would complete the scenario more accurately than those using the paper-based version. The results indicated a significant difference between the electronic- (Means Rank = 18.5) and paper-based system (Means Rank = 22.5) and selecting the correct dining location, $z = -2.478$, $p = 0.013$. However, there was no significant difference between the type of system being used and using the correct amount of credits.

A second Mann-Whitney *U* test was conducted to evaluate the hypothesis that participants using the new symbols would complete the scenario more accurately than those using the old symbols. The results indicated there was no significant difference between the type of symbol (old symbols and new symbols) and selecting the correct location (to view a list of the symbols, see Appendix F). The difference between participants using the new symbols (Mean Rank = 25.5) and those using the old symbols (Mean Rank = 19.5) in choosing the correct dining locations did approach significance, $z = -1.859$, $p = 0.063$, but did not reach the critical .05 cut off for statistical significance. There was no significant difference between the type of symbol being used and using the correct amount of credits.

A third Mann-Whitney *U* test was used to test the hypothesis that participants using the electronic system would have a higher accuracy rating than participants who use the paper-based system. Results indicated there was no significant difference in accuracy rating and type of system being used.

A fourth Mann-Whitney *U* test was used to test the hypothesis that participants using the new symbols would have a higher accuracy rating than participants who use the old symbols. Results indicated there was a significant difference in accuracy rating for varying types of symbols. (See Table 1).

Table 1

Mann-Whitney *U* Symbol Accuracy/Confidence Rating Test Results

Symbol	Description	Z Score	Significance value
	Participants who interacted with the new symbols had a higher confidence rating (Mean Rank = 26.41) in their response than participants who interacted with the old symbol (Mean Rank = 18.59)	z = -2.167	p = 0.03
	Participants in the old symbols group had a significantly higher accuracy rating (Mean Rank = 18.0) and a significantly higher confidence rating (Mean Rank = 30.11) in their answers for the old quick service symbol than participants in the new symbols group (Mean Rank = 27.0), (Mean Rank = 14.89), respectively	z = -2.83 (accuracy) z = -4.013 (confidence)	p = 0.005 (accuracy) p < 0.001 (confidence)

	Participants in the old symbols group had a significantly higher accuracy rating (Mean Rank = 17.0) and a significantly higher confidence rating (Mean Rank = 27.18) for the old table service symbol in their answers than participants in the new symbols group (Mean Rank = 28.0), (Mean Rank = 17.82)	z = -3.458 (accuracy) z = -2.476 (confidence)	*p* = 0.001 (accuracy) *p* = 0.013 (confidence)

Symbol	Description	Z Score	Significance value
	Participants in the old symbols group had a significantly higher accuracy rating (Mean Rank = 17.0) and a significantly higher confidence rating (Mean Rank = 28.73) for the old character dining symbol in their answers than participants in the new symbols group (Mean Rank = 28.0), (Mean Rank = 16.27)	z = -3.458 (accuracy) z = -3.272 (confidence)	*p* = 0.001 (accuracy) *p* = 0.001 (confidence)
	Participants in the old symbols group had a significantly higher confidence rating in their answers (Mean Rank = 26.5) for the old snack symbol than participants in the new symbols group (Mean Rank = 18.5)	z = -2.115	*p* = 0.034
	Participants in the old symbols group had a significantly higher accuracy rating (Mean Rank = 20.0) for the old signature dining symbol than participants in the new symbols group (Mean Rank = 25.0)	z = -2.037	*p* = 0.042
	Participants in the old symbols group had a significantly higher confidence rating (Mean Rank = 27.66) for the old dinner show symbol in their answers than participants in the new symbols group (Mean Rank = 17.34)	z = -2.721	*p* = 0.007

	Participants in the new symbols group had a significantly higher accuracy rating (Mean Rank = 18.5) for the old DDP symbol than participants in the old symbols group (Mean Rank = 26.5)	z = -2.394	p = 0.017

Discussion

The purpose of this study was to determine if an electronic version of the current Disney Dining Plan (DDP) information, as well as different symbols, would benefit guests more than the current paper-based system with the current symbols. The electronic system was hypothesized to result in a faster completion time, allow for a higher level of accuracy, and produce a higher overall satisfaction rating than the current paper-based system. In the same way, the new symbols were hypothesized to result in a faster completion time, show a higher level of accuracy and have a higher overall satisfaction rating than the current symbols. In multiple ways, this study supports the original hypotheses whereas in others, the electronic system and new symbols were not significantly better or worse than the current paper-based system.

Although there was a statistically significant difference between the paper and electronic groups based on the amount of time it took participants to complete the questionnaire, with participants in the paper-based system finishing more quickly than participants in the electron-based system, there could have been several reasons as to why this happened. As Lee and MacGregor (1985) discuss in their research, factors such as search strategy, scanning time, key-press time and computer response time all have the potential to increase the overall time it takes participants to complete a task. In this experiment, the participants who were in the paper-based group were able to scan a list of dining locations to answer the multiple choice questions, whereas the participants in the electronic-based group had to click (sometimes through multiple

screens) to find the answer they were searching for. Due to the several screens the electronic group had to click through, the amount of time it took them to complete the questionnaire task increased significantly. This however would not be an accurate representation of how the electronic system would be used in the real world. Guests staying at WDW will most likely not click to transition from park to resorts back to parks and other resorts in varying orders. The questionnaire was developed for this study to test the electronic systems ability to answer guest questions. This was important because it shows an electronic version of the system is able address everything the current system addresses.

Even though there was no statistically significant difference between the overall SUS score between the varying groups, participants using the electronic system did have a higher mean SUS score than participants in the paper-based group. This suggests that with a more realistic evaluation of usability, users may rate an electronic-based system more favorably than a paper-based system, although the present study cannot support this prediction.

With regard to the symbols, results did indicate several differences. For example, for five of the eight old symbols participants who were not previously exposed to the symbol did not know what the symbol represented. One of the most interesting outcomes of the old symbols is the old DDP symbol. Participants in the old symbols group were wrong about the meaning of the DDP symbol significantly more often than participants in the new symbols group. Even after being exposed to the old DDP symbol for a period of time, participants in the old symbols groups still did not know what the symbol represented. As for the private, in-room dining/pizza delivery symbol there was no significance difference because every participant provided an incorrect answer. Again, participants who were exposed to the symbol for a period of time were still unable to determine what the symbol represented. The old snack symbol also did not produce

significance, but this could be because the majority of the participants provided incorrect answers.

When it came to the new symbols, there was no significance difference in either accuracy or confidence rating. These results demonstrate that whether a participant was in the old symbols group or the new symbols group, they were able to identify what the symbol represented. This suggests that the new symbols have a higher degree of discriminability and meaning than the old symbols. However, the exact aspect of the new symbol that increased discriminability is not known (i.e., alphanumeric symbols, small pictures, or colors). Further research would need to be conducted to determine the aspect that helped participants discriminate between the new and old symbols.

Participants were also asked to provide feedback about the system and symbols used in the experiment. Participants who were in the paper-based group or the old-symbols group provided feedback such as:

"Having to look across that many papers, however, would be cumbersome if I had to do this while at the park,"

"Mobile / Cell phone app that could tell the customer how much credit he or she has left would be nice. Or some other kind of system that could rapidly inform the customer her or his dining credit availability,"

"The person and/or family would have to know what all the symbols mean before they start their adventure," and

"The system includes way too many different types of symbols to distinguish types of restaurants, each with a different effect on the dinning plan."

Participants in the electronic based group or the new symbols group provided feedback such as:

“I like that it displayed your current balance,”

“It is all pretty easy to use, and if I had more time to go through it all, it would have been a lot easier to use too,”

“It was nice. If anyone is interested in Disney, This ""Magic Your Way Package Plus Dinning"" will really [be] useful. It makes you feel comfortable,”

“I like the system, after a couple of clicks I got the hang of it. It is not hard to use at all. If you’re computer literate then there should be no issue with using the program. A couple minutes practice is all you need and you’re good to go.”

There are several features in the electronic-based system that were unable to be tested against the paper-based version due the location of the testing facility. Those features include the portability of the device, an up-to-the-minute balance of dining credits, up-to-the-minute reservations, and flashing icons to locate specific locations. These features could be tested in a field test which is recommended as a future expansion of this research.

Limitations

There were a few limitations within this study. The most significant limitation was the location. Because this experiment was conducted in a controlled environment, the reality of a field test was not able to be accurately captured. This experiment was conducted to ensure that an electronic version of the DDP would be able to address all the concerns the current paper-based system addresses about the DDP.

The participant population used in this study was also another limiting factor. All participants in this study had sufficient computer experience as well as limited motivation to

learn about the DDP. Since the guests who visit WDW are international in nature and encompass all ages it would be important to test a wider variety of users than were tested in this study. As Ryan and Deci (2000) define, "When intrinsically motivated a person is moved to act for the fun or challenge entailed rather than because of external prods, pressures, or rewards" (p. 56). Furthermore, in this controlled experiment participants did not have the pressures on them they would encounter if this experiment was done in the field of WDW. Nevertheless, this experiment demonstrated that an electronic version of the DDP is feasible and the next step would be to have guests test it while on vacation.

Future Research

User feedback supports the electronic version despite some of the results in this research. Although each hypothesis was not supported in this study, results suggest additional research is warranted. The electronic system does have to potential to support the original hypotheses because it addresses the issues in the preliminary study (i.e., limiting the amount of information exposed to a user at a given moment, explaining each of the dining options, integrating the different table service options into one (table service, signature dining, private in-room dining/pizza delivery, and dinner shows), only listing the dining locations that were available to the specific level of the DDP the guest purchased, and including a description of what type of food is available at each dining location). Testing a larger and more relative sample could support these hypotheses. This study did show that new symbols are necessary and the electronic system is no more difficult than the paper based system.

Since the generic symbol is designed to represent the entire DDP symbol, it is suggested to add a feature to the generic symbol design to separate it as a higher level symbol. One suggestion would be to have an extra boarder around the generic symbol to separate it from the

other symbols (see Figure 5). The picture used in the generic symbol could also lead to some confusion. The cup with straw symbol was used in this research because it is the current symbol used for the DDP. However, a more universal symbol to represent dining, such as a knife and fork, could lead to a better understanding of what the symbol actually represents.

Figure 5: Generic Symbol with extra border.

The electronic system is designed to provide guests with the necessary information they need for their DDP. The application gives the guests the ability to review DDP locations before beginning their vacation, whereas the current system does not allow a guest to receive the DDP pamphlet before checking in. The portability of the electronic system is also a benefit against the current paper system. Future field research could demonstrate that time could be saved using the electronic system in the actual field. Having guests refer to a map each time they are looking for a dining location is not practical at moments in the theme parks. Customizing each dining plan to each guest's specific DDP also gives the guest the necessary and required information they need.

An electronic based system that is accessible to guests via a handheld device with up-to-the minute information about their individual account gives the guest one less thing to worry about while on vacation. The current system requires guests to keep an accurate count of the several different credit types, along with addressing multiple maps to locate a dining location that is on their DDP. The electronic system gives guests the information they need at their fingertips to fully experience everything the DDP has to offer.

References

Baber, C. (2005). Evaluation in human-computer interaction. In Wilson, J, & Corlett, N. (Eds.), *Evaluation of human work* (pp 357-387). Boca Raton, FL: CRC Press.

Bangor, A., Kortum, P., & Miller, J. (2008). Determining what individual SUS scores mean: adding an adjective rating scale. *Journal of Usability Studies, 4*(3), 114-123.

Boring, R. (2009). "99% Boredom and 1% Sheer Terror" Nuclear Power Plants as Extreme Environments. HPEE 7th annual meeting, San Antonio, TX.

Brooke, J. (n.d.). SUS – a quick and dirty usability scale. Retrieved from: http://hell.meiert.org/core/pdf/sus.pdf?/

Buhalis, D. (1997). Information technology as a strategic tool for economic, Social, cultural and environmental benefits enhancement of tourism at destination regions. *Progress in Tourism and Hospitality Research, 3*(1), 71-93.

Buhalis, D. (1998). Strategic use of information technologies in the tourism industry. *Tourism Management, 19*(5), 409-421.

Carstens, D., & Patterson, P. (2005). Usability study of travel websites. *Journal of Usability Studies 1*(1), 47-61.

Collins, B., & Lerner, N. (1982). Assessment of fire-safety symbols. *Human Factors, 24*(1), 75-84.

Crimi, J. (2009). *Designing a new system for the Disney dining plan.* Presentation to a graduate class at Embry-Riddle Aeronautical University, Daytona Beach, FL.

Disney. (2009a). Compare Walt Disney World Resort vacation packages. Retrieved from: http://disneyworld.disney.go.com/vacation-packages/compare/

Disney. (2009b). 2009 Disney dining plan. [Brochure].

Endsley, M., & Strauch, B. (1997). Automation and situation awareness: The accident at Cali, Columbia. *Proceedings of the 9th International Symposium on Aviation Psychology*.

Geiselman, R., & Christen, F. (1982). Perceptual discriminability as a basis for selecting graphic symbols. *Human Factors 24*(3), 329-337.

Huizingh, E. (2000). The content and design of web sites: An empirical study. *Information & Management* 37, 123-134.

International Organization of Standardization. (1998). *Part 11: guidance on usability* (reference No. ISO 9241-11:1998(E)).

Kletz, T. (2001). Three Mile Island. In *Learning from accidents*. Woburn, MA: Golf Professional Publishing (pp. 122-125).

Kopala, C. (1979). The use of color-coded symbols in a highly dense situation display. *Proceedings of the Human Factors Society 23rd Annual Meeting*, 397-401.

Lee, E., & MacGregor, J. (1985). Minimizing User Search Time in Menu Retrieval Systems. *Human Factors: The Journal of the Human Factors and Ergonomics Society, 27*(2), 157-162.

Liu, M., & Wheat, J. (1995, June). *Designing effective multimedia kiosks*. Paper presented at the Annual World Conference on Educational Multimedia, Graz, Austria.

Mehlenbacher, B., Duffy, T., & Palmer, J. (1989). Finding information on a menu: Linking menu organization to the user's goals. *Human-Computer Interaction 4*, 231-251.

Mills, S. (1998). Integrating information – a task oriented approach. *Interacting with Computers*, 9, 225-240.

Mills, S. (2006). Integrated marine electronic systems – some user associated issues for the designer. *The Journal or Navigation*, 59, 423-433.

Molich, R., & Nielsen, J. (1990). Improving a human-computer dialogue. *Communication of the ACM 33*:3, 338-348.

Nicholas, D., Huntington, P., Williams, P., & Vickery, P. (2001). Health information: An evaluation of the use of touch screen kiosks in two hospitals. *Health Information and Libraries Journal*, *18*, 213-219.

Nielsen, J., & Molich, R. (1990). Heuristic evaluation of user interfaces. *Proceedings of CHI 1990.*

Remingston, R., & Williams, D. (1986). On the selection and evaluation of visual display symbology: Factors influencing search and identification times. *Human Factors 28*(4), 407-420.

Rodriguez, N., Murillo, V., Borges, J., Ortiz, J., & Sands, D. (2002). A usability study of physicians interaction with a paper-based patient record system and a graphical-based electronic patient record system. *AMIA 2002 Annual Symposium Proceedings*, 667-671.

Ryan, R., & Deci, E. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology*, 25, 54-67.

Seffah, A., Donyaee, M., & Kline, R. (2006). Usability measurement and metrics: A consolidated model. *Software Qual 14*, 159-176.

Smith, B., & Simon, M. (2009). How data integration systems affect strategic decision making in small forms. *Journal of Small Business Strategy 29*(1), 35-51.

Troyer, O, & Leune, C. (1998). WSDM: a user centered design method for Web sites. *Computer Networks and ISDN Systems 30*, 85-93.

Tung, L. (1999). The implementation of information kiosks in Singapore: An exploratory study. *International Journal of Information Management* 19, 237-252.

Ververs, P., Dorneich, M., Good, M., & Downs, J. (2002). Integrating critical information on flight deck displays. *Proceedings of the Human Factors and Ergonomics Society 46th Annual Meeting*, 11-15.

Yeh, M., & Chandra, D. (2004). Issues in symbol design for electronic displays of navigation information. *Proceedings of the 23rd DASC conference*, 24-28.

Appendix A
DDP Multiple Choice Questionnaire
(Correct answers are in **bold**)

1. What type of dining option would you use to eat at Tony's Town Square in Disney's Magic Kingdom Park?

A: quick service
B: table service
C: snack

2. If you had a family of 4, 2 adults and 2 children, how many table service meal credits would you use to eat at the character dining location Fairytale Dining at Cinderella's Royal Table in Disney's Magic Kingdom Park?

A: 2
B: 4
C: 8

3. Which of the following items are **not** included on the Disney Dining Plan?

A: Souvenir or refillable drink mugs
B: A frozen ice cream novelty
C: A single-serving prepackaged milk or juice

4. What type of dining option would you use to eat at the Electric Umbrella in Epcot?

A: quick service
B: table service
C: snack

5. Which of the following quick service dining locations offers breakfast in Disney's Magic Kingdom Park?

A: Pinocchio Village Haus
B: Main Street Bakery
C: Columbia Harbor House

6. What is the phone number to make a Disney Dining reservation?

A: 407-WDW-DINE
B: 407-WDI-SNEY
C: 407-DDP-RESV

7. If you started with 8 quick service coupons for a family of 4, and each person had a quick service meal at Flame Tree Barbecue in Disney's Animal Kingdom, how many quick service credits would you have left?

A: 2
B: 4
C: 6

8. If you started with 4 table service credits for 2 adults, and each person had a meal at the Coral Reef Restaurant in Epcot, how many credits would you have left?

A: 1
B: 2
C: 4

9: Which of the following items **can** be purchased using a snack credit?

A: glow cubes
B: refillable drink mug
C: popcorn scoop

10. Which of the following locations offers character dining in Epcot?

A: Chip 'N' Dale's Harvest Feast at The Garden Grill
B: Cantina de San Angel
C: Biergarten Restaurant

11. How table service credits are needed for an in room pizza delivery at Disney's Port Orleans Resort?

A: 1
B: 2
C: 3

12. Which of the following dining locations has a dress code at Disney's Contemporary Resort?

A: Contempo Cafe
B: The Wave
C: California Grill

13. Which of the following dining locations requires two table service credits per person to eat at in Disney's Grand Floridian Resort & Spa?

A: Gasparilla Grill & Games
B: Citricos
C: Supercalifragilistic Breakfast at 1900 Park Fare

14. In which land is the quick service location Pinocchio Village Haus located at Disney's Magic Kingdom Park?

A: Tomorrowland
B: Adventureland
C: Fantasyland

15. Which of the following locations has gratuities included at Disney's Wilderness Lodge Resort?

A: Private In-room Dining
B: Roaring Fork
C: Whispering Canyon

16. At which quick service location can you eat breakfast at Disney's Hollywood Studios?

A: ABC Commissary
B: Fairfax Fare
C: Rosie's All American Café

17. Where would you pick up dinner show tickets for Disney's Spirit of Aloha Dinner Show at Disney's Polynesian Resort?

A: You don't need one, your reservation is your ticket
B: They are delivered to your room
C: Your Disney Resort hotel concierge desk

18. Which of the following items are **not** included using a table service meal for dinner on the Disney Dining Plan?

A: Alcoholic beverage
B: Entrée
C: Dessert

19. What are the number of meals during your package stay on this Disney Dining Plan?

A: Two quick service, one snack, and one table service per person per night
B: One quick service, one snack, and one table service per person per night
C: One quick service, two snacks, and one table service per person per night

20. Which of the following items are **not** included for lunch/dinner using a quick service meal on the Disney Dining Plan?

A: Entrée
B: Non-alcoholic beverage
C: Appetizer (Guests ages 3-9 only)

Appendix B
System Usability Scale (Brooke, n.d.)

1= Strongly disagree
5= Strongly agree

1. I think that I would like to use this system frequently

1	2	3	4	5

2. I found the system unnecessarily complex

1	2	3	4	5

3. I thought the system was easy to use

1	2	3	4	5

4. I think I would need the support of a technical person to be able to use this system

1	2	3	4	5

5. I found the various functions in this system were well integrated

1	2	3	4	5

6. I thought there was too much inconsistency in this system

1	2	3	4	5

7. I would imagine that most people would learn to use this system very quickly

1	2	3	4	5

8. I found the system very cumbersome to use

1	2	3	4	5

9. I felt very confident using the system

1	2	3	4	5

10. I needed to learn a lot of things before I could get going with this system

1	2	3	4	5

Appendix C
Symbol Discriminability Task

What does this symbol represent?

How confident are you in your answer?
1 – not confident at all
7 – very confident

What does this symbol represent?

How confident are you in your answer?
1 – not confident at all
7 – very confident

What does this symbol represent?

How confident are you in your answer?
1 – not confident at all
7 – very confident

This format was used for all the symbols found in Appendix F.

Appendix D
Informed Consent Form

#____

Identifying an Optimal Dining Plan System for the Entertainment Industry
Informed Consent Form

Conducted by Joseph Crimi
Advisor: Dr. Jason Kring
Embry-Riddle Aeronautical University
Department of Human Factors & Systems
Daytona Beach, FL 32114

The experiment you are about to participate in is concerned with your understanding of the Disney Dining Plan (DDP). This experiment will be broken up into five distinct parts: you will have time to familiarize yourself with the DDP, you will then be asked to answer some questions in which you can use your resources to help you answer the questions, next you will be asked to complete the system usability scale, then you will perform a symbol discriminability task and finally you will be debriefed on the experiment. The entire experiment should last approximately 30-45 minutes.

Your participation in this experiment is completely voluntary and there are no known risks associated with this research. You may terminate your participation in this experiment at any time. Your results will remain confidential and anonymous. Your participation in this study will give us a better understanding of your perspective of the DDP and possible ways to improve the system.

Thank you for your participation. If you have any questions please ask during the experiment or feel free to contact me at joseph.crimi@gmail.com.

Statement of Consent

I acknowledge that my participation in this experiment is completely voluntary and that I am free to withdraw at any time. I have been informed of the general purpose of the experiment.

Participant's name (please print): _____

Signature of participant: _____ Date: _____

Signature of experimenter: _____ Date: _____

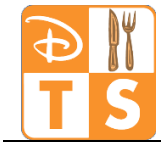
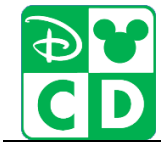
Appendix E
Scenario

You are staying at Disney's Contemporary Resort. You, your spouse and 2 children plan to spend the day at EPCOT. You need to find a dining location for breakfast, lunch and dinner. You may travel back to your resort during the day if you wish. You have a total of 8 table service credits, 4 quick service credits, and 4 snack credits. Where are you going to dine and what is your remaining balance?

Answer: If they choose a signature restaurant for lunch/dinner they will use all 8 of their table service credits and have 0 table service credits left over. They would then have to eat lunch/dinner at a quick service location in which they would use their 4 quick service credits. They may use their 4 snack credits anytime throughout the day.

If they choose a table service restaurant for lunch/dinner they will use 4 table service credits and have 4 table service credits left over. For lunch/dinner they will have 4 table service credits where they eat at another table service location or use their 4 quick service credits to eat at a quick service location. They may use their 4 snack credits throughout the day.

Appendix F
DDP Symbols

New Symbols	Old Symbols
New DDP Symbol 	Old DDP Symbol 
New Quick Service Symbol 	Old Quick Service Symbol 
New Table Service Symbol 	Old Table Service Symbol 
New Character Dining Symbol 	Old Character Dining Symbol 
New Snack Symbol 	Old Snack Symbol 
	Old Signature Dining Symbol 
	Old Dinner Show Symbol 
	Old Private In-Room Dining/ Pizza Delivery Symbol