

Raid the fridge!": Promoting Healthy Eating Habits Through the Game Monster Appetite

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Abstract: Monster Appetite is a web-based health education game, modeled on a previously developed card game by the same name. In each round, a player is presented with a number of food items and tries to select the superlative card, measured by the calories per serving. The player must select the highest caloric food card before another player does, resulting in a race to identify the best (i.e., highest in calories) card first. The subversive approach (i.e., making one player's monster avatar as fat as possible), fast decision-making and competitive game play keep players engaged and encourage them to rethink their daily food choices. A flexible backend implementation allows the game mechanics to be easily modified and rolled out to subsets of the user base to run control-treatment gameplay testing. Monster Appetite is designed to collect anonymized user data to build a dataset of health food awareness in relation to demographics.

Background

The obesity epidemic is one of America's largest public health challenges and a growing concern in the rest of the world that creates disparities among race, ethnicity, region and income (F as in Fat, 2010). Currently, there are over 12 million obese American children and adolescents and there has been an 82-percent increase of obesity in the last 20 years worldwide (Nair, 2012). Acknowledging the severity of the issue, in 2013 American Medical Association decided that obesity be recognized as a disease so that appropriate measures are taken for treatment and prevention (Frelick, 2013).

Much research has been done on genetics and physiology on appetite control and consequently individual treatments such as calorie prescriptions have been introduced to the market. However, there is still great concern over a lack of research on preventative care programs to avoid obesity and other related diseases (Han, 2010). Monster Appetite is at once a game targeted at preventative care and designed to facilitate further research into the effectiveness of preventive care policies in a fun, game-based approach.

Game Design

The original card game version of Monster Appetite (hereafter simply 'the card game') (see Figure 1) asked users to select the food card with the highest caloric value. The accompanying narrative of the game was to make the player's monster avatar as fat as possible after one week in game time. Each game day has three meals and a midnight snack. A meal consists of choosing the food card in competition with other players. The midnight snack introduced different elements to drastically alter player's scores, for example giving another player a nut allergy and preventing them from choosing foods containing nuts. In addition to allowing for exploration of more nuanced health topics such as allergies, the midnight snack round serves as a critically engaging game mechanic. In initial testing, students received the game as first and foremost entertaining, instead of as a pure, preachy educational activity (Author, 2013).



Figure 1: Monster Appetite paper-prototype.



Figure 2: Monster Appetite digital-prototype.

Many games promote nutritional awareness by teaching healthy eating habits. The card game version of Monster Appetite employed the opposite approach by teaching players to identify the least healthy choices. This mechanic was abstracted so that the game can be reconfigured so that the goal is to choose the card based on lowest caloric value, most calcium, most fatty, etc. Little investigation has been done into the relative effectiveness of each approach. The digital version of Monster Appetite has been programmed to be easily reconfigurable so that we can deploy both versions to subsets of the user base for treatment-control testing to see which approach manifests the most effectiveness in self-efficacy and behavioral change.

Data Collection and Analysis

During user registration we ask the player to allow us to use their information in our study and record their approximate location of residence. Evidently there are privacy concerns and legal implications in the collection of personal data, especially if minors will be using this platform. Working through these legal details remains a problem to be solved in future work. During game play we then record every click the user makes. For each round (meal), we record the options given to the player, the player's choice and the speed of the player's choice.

We hope to use data collection techniques towards two ends in this project. On a user level, our data collection allows us to track the progress of individual users as they play the game multiple times. We hope to see users improve on their selections and pick the best cards more quickly and accurately. Our hope and expectation is that this would then translate into the players' daily food choices, and help them avoid unhealthy options. This data would also allow for the development of an automatic tutor in future work.

Additionally, this data can work in the aggregate to build a big data set. Since each meal yields a data point per user, a single play of the game yields 21 data points. This allows us to quickly collect data and build user profiles, even if they play only one round. With these data points we can perform queries to investigate the relationship between food knowledge and demographics.

As an example study, we may wish to investigate the correlation between income and ability to identify high caloric foods. For this we simply query the database for each users location and average accuracy (of selecting the highest card out of the given options) over all rounds. From locations we can build an income map to estimate the user's household income (U.S. Census Bureau, 2010). If there is a direct correlation between income and accuracy, we may infer that a primary causation of obesity in low-income areas is due to lack of education. However, if there is no correlation between income and accuracy, we may infer that a primary causation of obesity in low-income areas is due to lack of accessibility. Studies like these become simple when large data sets (i.e., the one generated by Monster Appetite) are available and can provide strong evidence to support policy decisions.

Future Work

One of the major hurdles for this project is the legal implications and practicality of demographic data on the users. We could simply collect the user's zip code, from which we can retrieve general demographics of the region (U.S. Census Bureau, 2010). Far more helpful would be to ask the user more intrusive questions to directly discern race, age, income, education, weight etc. However, before this step is taken, we must investigate the legality of requesting this information over the Internet. One of the venues the researchers are looking into is already available public data sets such as the ones from National Health and Nutrition Examination Survey (NHANES) provided via the Center for Disease Control and Prevention. A similar survey model of NHANES was used for the NYC HANES survey project that was conducted in 2004 and the survey collected information such as demographic indicators including gender, age, race/ethnicity as well as BMIs and health conditions such as diabetes, high blood pressure, high cholesterol and depression (NYC Health and Mental Hygiene, 2013). Since there is precedent of such information being collected the researchers next step would be to learn how such licenses are obtained.

While the majority of the coding has been done for the backend implementation, the frontend is not yet polished to have the look of a commercial game. Since a major goal of this project is building a user base of repeat players to collect data over a period of time, the game must be as engaging as possible. A large part of sustained engagement will come from a finely tuned interface.

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