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An Investigation of the Green Grove Initiative

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AN INVESTIGATION OF THE GREEN GROVE INITIATIVE

By

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ABSTRACT

Game days, particularly football game days, at division one universities generate a great deal of waste. At the University of Mississippi, the amount of waste generated on home football game Saturdays has been increasing. Increasing recycling by spectators may decrease the amount of waste generated and reduce the negative environmental impact of game days. The purpose of this case study was to explore the development and evaluation of interventions that may be effective for increasing recycling behaviors. Various interventions were implemented at each game of the 2012 season. Recyclables were collected and waste was measured following each game. Games with only the use of education and direct prompting had the lowest recycling rates. There were higher rates of recycling found when more interventions were used. Higher rates were also found when incentives were available for recycling. The findings suggested that incentives may be a good motivator for behavior change among sports fans. The findings also suggest that universities should explore using a wide variety of recycling interventions simultaneously.

Green Grove Initiative

On average, each individual in the United States produces 4.3 pounds of garbage every day. That is 1,569.5 pounds of trash per individual per year. That is triple the amount of waste America produced in 1960. The United States currently has 3,091 active landfills and over 10,000 municipal landfills, according to the Environmental Protection Agency. Each of these creates air emissions, specifically methane, and gases that eventually leach into the ground water (Hansen, 2013). "Modern industries still operate according to paradigms that developed when humans had a very different sense of the world" (McDonough and Braungart, 2002). This world referred to is a past life style where resource depletion was not a concern, and resources were thought to be endless. In 1972, the United Nations convened the Conference on the Human Environment where

the global community acknowledged that more exploration was needed of the inter-relationships between the environment and socio-economic issues of poverty and underdevelopment. Thus, the concept of sustainable development emerged in the 1980s in response to a growing realization of the need to balance economic and social progress with concern for the environment and the stewardship of natural resources (as cited on Hanson, 2013)

The environmental and waste statistics are abundant as America and the world continually over-consume and produce massive amounts of waste.

There have been multiple movements to push for sustainable living across the world. Many programs educate people about the over-consumption and use of food, water and energy. Certain programs encourage the reuse of products and buying of products that have a low envi-

ronmental impact and have a long span of use. This can be to simply reduce the amount of products created and waste generated. Additionally, recycling has been offered as a technique to combat waste.

Recycling programs have been implemented in small businesses and large corporations and have become more popular in households. Since 2003, recycling has reduced the amount of trash thrown away in the United States by 32% (approximately 79 million tons per year), which is a step in the right direction. However, Americans are also increasingly consuming, and packaging has increased on all products, so the net effect is minimal (Mom, 2010).

Ole Miss Game Day Contributions

Though individuals may be taking steps to reduce waste and increase recycling, some circumstances and traditions make this a very challenging task. For example, large events often produce massive amounts of waste that are dumped in the nearest landfill. These events include sporting events, especially at large universities with dedicated fans. The University of Mississippi, Ole Miss, is known as a university with a unique spirit, great history, and extremely passionate fans of the school's sports teams. Since the beginning of Ole Miss's first football team in 1893, the love of football has continually grown and today brings in ten of thousands of fans for each game during the season. A typical game day at Ole Miss includes between 50,000 and 70,000 fans, tailgating tents, and a lot of the school's colors, red and blue. Game days have an impact on not only the university, but the town of Oxford. Oxford receives a mini-economic boom each game day weekend as the 60,000 visitors also bring in money spent locally on shopping and dining (Aschoff, 2012). Hotels completely book before the season starts and maximize profits by doubling room costs and enforcing a two-night minimum policy.

Game days not only cater to long-standing fans, but are vital in the recruiting process. Many football players have committed to Ole Miss to simply be a part of the one-of-a-kind game day experience and take the famous walk down the Walk of Champions (Z. Nutt, personal communication, September, 12, 2013). Prospective students are enticed by Ole Miss when attending a game and presented with the opportunity to be involved in the Grove's (the famous tailgating area) food, hospitality and festivities for the next four years. In *Sports Illustrated's* top 100 things you must do before you graduate, "tailgate in The Grove" was listed as number three ("Top 100 things," 2003). Visitors have said, "*Ladies and Gentlemen, I have been to the land of Milk and Honey Boo Boo and let me assure you, all the Taiwanese tales of grandeur that you've heard regarding "The Grove" being the greatest tailgating experience on Earth are not only true, but probably grossly understated*" (as cited in Anderson, 2013). Needless to say, the event has become more than a simple competition, but a social practice in which people gather to eat, drink, support, experience fellowship, and make memories.

An unfortunate but definite by-product of this influx of people is the large amount of waste accumulated through purchases and pre/post game consumption of food and drinks. In the 2012 football season, Ole Miss produced 489 tons of waste. That is, on average, 70 tons of waste per game ("Green," n.d.). If the 70 tons of waste contained even amounts of aluminum, paper, cardboard, glass, and plastic, that would fill 2,030 cubic feet in a landfill. That is about equivalent to the holding capacity of five concrete trucks. This is a major issue.

Recycling Helps

The traditional practice in this tailgating experience at the University involves large amounts of food, beautiful decorations, and extravagant tents. Simplifying game day activities to

produce less waste at Ole Miss is unlikely to happen. It seems likely that the most effective way to reduce the amount of waste going to landfills is to increase recycling. Recycling products allows them to be reused and preserves our environment and natural resources. For example, recycling paper produces almost 74% less pollution than making new paper and almost 50 % less water is required for this process (“Interesting,” 2009). It takes 95% less energy to recycle aluminum than it does to make it from raw materials. Making recycled steel saves 60% of energy that would have been used to create this product new. Similarly, recycled newspaper saves 40%, recycled plastic saves 70%, and recycled glass saves 40% of the energy used in new product generation (“Recycling,” 2009). These energy savings not only reduce the harmful chemicals released and used in making these products, but also reduce energy costs. Recycling efforts create jobs and reduces waste in landfills. Recycling is a vital aspect in making game days at the University of Mississippi more sustainable.

Recycling Behavior can be Difficult to Increase

Studies and surveys have shown that people generally have positive attitudes about environmentally friendly behavior and most are fond of the idea of recycling. But, these positive attitudes about recycling are not always good indicators of the number of people who actually participate in the action. In Corbett’s *Communicating Nature* (2006) he states, “And despite poll numbers that show fairly consistent, widespread environmental concerns, Americans are using more energy, building ever larger houses, driving more miles, and buying more stuff” (p. 74). This means that though people generally say they have environmental concerns, they are continually environmentally irresponsible and fail to participate in eco-friendly acts, like recycling.

The action of placing a plastic bottle in a recycling bin may seem simple, but many contextual factors can make recycling very difficult and in some instances impossible.

Troubles with Recycling. It can be argued that some of the main reasons people do not recycle are because it is inconvenient, and because people are uninformed on the issue and how it is done properly. Some neighborhoods and events have good waste management programs to keep areas clean and groomed, but sometimes recycling programs can simply be overlooked. It is likely that if recycling bins were as frequent and convenient as trash cans, they would be used more often (Hooper & Nielsen, 1991). However, many times it is simply inconvenient and costly to initiate a new recycling program. The Office of Solid Waste of U.S. Environmental Protection Agency shows that a well-run curbside recycling program can cost between \$50 to \$150 per ton (as cited on “Recycling prices,” 2009). Although in most cases this is less than trash collection, recycling programs are an add-on to trash collection rather than a replacement.

Even when a recycling program is implemented appropriately it must be used properly. For cities that do not have single-stream recycling the separation and organization of plastics, aluminum, paper, and other recyclables are necessary and sometimes costly. Bins can be provided to the public for each type of recyclable, but these bins are expensive. Also, staff can be used to separate the material, which requires a cost of labor (B. Geller, personal communication, December 18, 2012). Finally, once all the recyclables are collected and organized they must then be taken to the recycling plant. In less developed countries, and small towns in the United States, recycling is taken to a separate location from regular waste (B. Geller, personal communication, December 18, 2012). These factors contribute to the inconvenience and effort required by recy-

cling. This may explain its lack of participants in a society of downloadable movies, instant mashed potatoes, and Google.

Troubles with Recycling at Ole Miss. In addition to the normal difficulties of recycling, the University of Mississippi game day has many more contextual factors increasing this challenge. Because of the arrangement of the stadium and tailgating areas, recycle bins are not as conveniently located and used as rubbish bins. Additionally, fans often fail to make the distinction between the recycling bins and trash cans. This often results in garbage being thrown in recycle bins, contaminating the entire bag. These contaminated bags are then often placed with normal trash and not recycled at all. The spirit for the football game, especially at Ole Miss, creates a fun and welcoming atmosphere. However, this passion may lead to a disregard for other important issues. It may be that fans are so infatuated with the game that remembering to recycle their plastic bottles is the last thing on their mind. These challenges prove difficult and there are few published studies on how to overcome such specific hurdles. However, many approaches exist on how to change behavior and provide a sound, theoretical basis to change the non-environmentally friendly behavior of football fans.

Behavior Change Approaches

Improving Education. “Lack of knowledge is a factor that can explain the weak relationship between environmental concern and environmentally responsible behavior” (Hines, Hungerford & Tomera, 1984, p. 2). One of the approaches to improving environmental behavior involves the use of education. This approach revolves around the idea that if one is provided with the information regarding environmental issues, he or she will make more environmentally friendly decisions. It hinges on the belief that the reason a person does not make the environmen-

tally friendly choice is because he/she has not been properly educated on the cost of environmentally harmful actions and the benefits that recycling would provide (Gardner & Stern, 1986, p. 273).

Education about environmental issues and recycling has been shown to increase recycling in multiple studies. Oskamp suggests that recycling behaviors may be less related to knowledge about global environmental issues than to knowledge about the specifics of recycling (as cited in Schultz, Oskamp & Mainieri, 1995, p. 107). In a meta-analysis of empirical studies on recycling, researchers found that knowledge about the recycling program has been found to correlate with recycling. In general, the more information a person has about which materials are recyclable, or where recyclables are collected, the more likely that person is to recycle (Schultz et al., 1995, p. 107).

In a recent study conducted at the University of Florida, researchers explored this idea of education promoting behavior change. Researchers measured the effect of education on a local community's recycling participation. The education was disseminated through public media, which was then also analyzed for effectiveness of not only informing, but encouraging recycling within the community. The study classified each of 67 counties as high, medium, or low in their media efforts to promote recycling, based on a variety of factors. An individual level recycling score was given to participants in the community and a regression model was calculated connecting the multiple variables measured. The estimated regression model did show that "...recycling program knowledge is related to participation" (Martinez & Scicchitano, 1998, p. 296).

Prompts. Another technique used to change behavior is through the use of prompts. To prompt something is to move or induce it to action. In learning and behavior analysis it is useful,

sometimes, to prompt the occurrence of a behavior with cues that signal a subject to perform a desired action. The presentation of a prompt can be visual, vocal, gestural, positional, or physical. Generally, the prompting is gradually reduced in frequency or intensity so that the behavior occurs or is maintained without intervention.

The use of prompting has been examined in the natural setting of a football stadium. Two forms of prompting and other treatments were used to modify adult littering behavior. Findings revealed a highly significant main effect of the prompting treatments that were responsible for a 45% reduction in the amount of litter in the treated sections of the football stadium (Baltes, Margaret, Hayward, & Scott, 1976).

Direct Prompts. In one study signs (a form of direct prompting) were looked at for their effect on recycling in the University of Idaho's cafeteria. The university had previously placed signs and recycling bins in the cafeteria for their polystyrene materials. For the first five years, however, the bins were rarely used. When the recycle containers were used, they were often filled with contaminants of food or drinks. These contaminants resulted in the bags being thrown out because of the non-recyclable material. Reports came from university environmentalists who felt the students and staff to be "...hopelessly indifferent to the environment" (Werner, Rhodes & Partain, 1998).

Researchers proposed that the problem was not in the University's employees or students, but the lack of effectiveness in the signs promoting the recycling. The researchers proposed that the instructional signs need to take into account what people expect them to say and how people expect to act in the situation (Werner et al., 1998). Their study tested signs that were large, designed to attract attention, and specific in content. The results showed that the type of signage used greatly affects the amount of recycling that is collected. The case study showed changes in

both behavior and knowledge with respect to polystyrene recycling after the new signs were installed.

Model Prompts. The phenomenon of learning through observation is well established and can be identified as vicarious learning or observational learning (Change, 2006, p. 266). Many experiments have shown the effects of one subject's behavior influencing the behavior of another subject, human and non-human. Modeling techniques typically involve a target behavior demonstrated in front of by-standers who are then, sometimes unknowingly, observed on their participation in that target behavior. Numerous studies have demonstrated that human observers tend to learn more from models who are competent, attractive, likable, and prestigious than from models who lack these characteristics (Chance, 2006, p. 282).

In a study conducted at the University of Colorado at Boulder, researchers found that more than simple reminders and informational brochures were necessary to change behavior (Hooper & Nielsen, 1991) The study compared the effectiveness of neighborhood leaders, prompts, and pamphlets at changing recycling behavior. It found that one-third of households with neighborhood leaders recycled regularly, while only one-fifth of households that received prompts or pamphlets recycled regularly. Similarly, research found that three public service announcements designed to convey that recycling was prevalent, acceptable, or prevalent and acceptable (a type of model prompting) were all found to increase intent to recycle and resulted in up to a 25% net increase in recycling tonnage compared to the control group (Cialdini, 2003).

The Environmental Motivation Project created a guide on tools used to engage and motivate students to recycle. Some of the suggestions include focusing on the positive aspects of recycling at one's school, even if there are not many. For example, this can be by publishing survey results that show that most students or faculty support recycling. Additionally, emphasizing that

important people in your audience, such as popular students or well-known faculty members, recycle can prompt other students to similarly engage in the activity (Kelly, Little, helps, Roble, Zint, 2012).

Incentives. Another method which has proven to be successful for changing behavior is the utilization of a system of rewards. This involves the use of rewards for certain actions to facilitate behavior change. The assumption is that rewards are necessary for such behavioral patterns to be repeated.

A study done at Virginia Polytechnic Institution and State University compared the effects of both prompts and reinforcement to promote recycling in six university dormitories. For a prompt condition, residents were urged to recycle paper for ecological reasons via flyer distribution to each room. For the personal incentive condition, residents were given one raffle ticket for every pound of paper brought to a collection center. For the group incentive condition, two dorms were paired and the dorm whose residents delivered the most paper won money for its treasury. The results showed that providing some incentive through either a raffle or a contest was effective for significantly increasing the amount of recycled material by the college students. The positive reinforcement contingencies (i.e., the raffle and contest) increased quantities of paper delivered to dormitory collection rooms above baseline levels and above the levels observed subsequent to distribution of flyers urging paper-recycling behaviors for the improvement of ecology (i.e., the prompt condition) (Austin & Vancouver, 1996).

Ease of Recycling.

Multiple studies have shown that the more convenient it is to recycle, the more people participate. In a study done at Appalachian State University, recycling behavior was studied

within an ABA multiple baseline design by placing recycling receptacles in central locations and in classrooms where beverages were primarily consumed. The percentage of cans recycled daily increased during intervention and returned to near baseline levels when the receptacles were removed (Ludwig, Gray, & Rowell, 1998).

A similar study at the University of Houston-Clear Lake showed that manipulating the appearance or number of recycling bins in common areas (such as hallways or student lounge areas) did not increase recycling. Consumers recycled substantially more plastic bottles when the recycling bins were located in classrooms (O'Connor, Lerman, Fritz, & Hodde, 2010). These studies show that the closer and more convenient the bins were to the students, the more the students recycled.

The Present Case Study

The purpose of the present case study was to develop and evaluate a variety of interventions to increase recycling behavior at the University of Mississippi on game days. The author served as the Green Grove Coordinator during the 2012 Football season. This role allowed the author to develop various interventions and implement these on game days. The author collected recycling data from the University's Landscape Services, calculated the metrics, and used personal observation to gain further knowledge about the most effective methods.

Methods

Participants

Participants of this study included fans, either Ole Miss or opposing teams, who tailgate in the Grove and Circle on game days and those who attend the games. Vaught-Hemingway Sta-

dium holds 60,580 people. Depending on the game, there are typically more fans who tailgate than those who actually attend the game.

It is important to note that actions done in the tailgating areas are separate efforts from those performed in and outside of the stadium during the football games. Methods can be separated into two categories. “Tailgate Efforts” include those interventions performed in the Grove and Circle at the University. “Stadium Efforts” are interventions targeted inside and directly outside of Vaught-Hemingway Stadium.

As the Green Grove Initiative was a new initiative at the University of Mississippi, many efforts to promote recycling were repeated at each game as well. Some efforts were added and others were removed, depending on the success or context of the game. Table 1 shows which tailgate, stadium, and combined interventions were used at each game of the season.

Efforts using Education

Tailgating Efforts. For this football season, education was done by word of mouth. Certain games had volunteers who were educated on the environmental impact of Ole Miss game days. These volunteers were then instructed to go into the certain sections of the Grove and Circle and educate the tailgaters. Volunteers normally started with, “Do you know how many tons of waste Ole Miss produces on a game day?” After grabbing tailgaters’ attention, they informed them on the impact of game days and talked with them about what and how to recycle.

Efforts using Direct Prompts

Tailgating Efforts. Signs were used as direct prompts in tailgating areas. These signs were placed in the most highly trafficked areas throughout the Grove and the Circle. They were large 3.5 ft. by 3 ft. A-frame signs on which recycling instructions were clearly printed. These

frames also included recycling and waste bags which fans could tear off and take back to their tent for use. Recycling bags were white in color and clearly labeled on the sign, but not on the bags themselves. Waste bags were placed below recycling ones and were black in color, again clearly labeled on the sign but not on the bags themselves. Recycling bins were also conveniently placed around the Grove and Circle.

The second direct prompt was formed through the creation of a logo for the Green Grove Initiative. As mentioned earlier, the Grove is a long-standing, beloved tradition among Ole Miss fans. This new logo conjoined the Grove, including the traditions it holds, with a green-friendly message. The logo was a spin-off of the original “I heart New York” shirts, but related to the school’s situation and said “I Tree Grove.” The word “tree” was not actually on the shirt, but rather there was a picture of a tree. This logo was also considered clever as trees are one special part that encompasses the Grove. The natural elements, specifically the old oak trees of the 11 acres, are some of its most beloved traits. As the logo connected the Grove and green efforts, everywhere the logo was seen it acted as a prompt to act sustainably, specifically in our efforts to recycle.

This logo was printed on reusable and recyclable cups stickers, and business cards which volunteers left at the tents during their education effort. The logo was also printed on shirts, which volunteers wore, and which were for sale to the public. The idea was that when people saw the logo throughout the day it would remind them to recycle. Similarly, when one invested in the effort, like buying a shirt or using the cups, the prompt was thought to be more likely to register with that individual. The logo grew in popularity and shirt sales continually increased throughout the season.

The third direct prompt can also be labeled as a matter of convenience for tailgaters. As volunteers passed out stickers, cups, and cards, they also handed out recycling bags at individual tents. The recycling bags not only acted as a prompt to remind tailgaters to recycle, but made the action of recycling more convenient. It is important to separate the prompt from convenience because inconvenience is one major source of non-recycling. For example, the direct prompt of a sign may remind a person that it is good to recycle their cup, but provides no way of doing it. The recycling bag, however, reminds the individual to recycle and then conveniently provides them the opportunity.

Stadium Efforts. Direct prompts were also used outside of the stadium and within the stadium to remind fans to recycle their bottles and cups. Because drinking is a common activity associated with tailgating, fans walk with their cups or bottles to the stadium where they then must dispose of the drink before entering. Wastes therefore often overflow in garbage bins directly outside the gate.

To reduce waste and increase the recycling directly outside the stadium, volunteers were stationed at the highly trafficked gates to remind fans to place their cup or bottle in the recycling bins rather than the trash cans. Though each fan was not reached due to high numbers and sometimes quiet volunteers, many people heard the direct prompt as they were entering the stadium. These volunteers were also wearing Green Grove T-shirts. Individuals who could not hear or understand what the volunteers were saying may have seen their shirts, which also acted as a direct prompt.

During the game another direct prompt was given to attendees via a jumbotron message. This game time announcement simply reminded fans to recycle their plastic bottles on the way

out of the stadium. On the giant screen the recycling symbol was shown while the announcement was made.

Efforts using Modeling Prompts

Tailgating efforts/ Stadium Efforts. The use of many of the modeling prompts was in the form of pictures via social media. The social media included Facebook and Twitter, which many Ole Miss sports fans follow prior to game days. The modeling prompts were demonstrated before game day. Fans are dedicated to following the celebrities used as models on social media and through this are connected to them. It was hypothesized that these prompts would connect with fans and act as a prompt for recycling on game day.

The first modeling prompt was pictures with the Rebel Black Bear (Ole Miss's Mascot), popular football players, and the Head Coach Huge Freeze. Rebel Black Bear was pictured in a Green Grove shirt recycling a plastic bottle in a recycling bin. Pictures were then taken of the team players and head coach also wearing the Green Grove shirt. The photos were then edited with sayings such as "Coach Freeze Supports a Green Grove." Pictures with the team's kicker were labeled, "Andrew Ritter is Kicking it for a Green Grove." One photo, which was particularly popular, pictured the team's largest players pointing at the audience with stern faces enforcing fans to "Recycle... Do It." These photos were pictured over the Office of Sustainability's Facebook page as well as the University of Mississippi's official page which is followed ("liked") by 32,683 people (as of 11/2013). The pictures were also shared via Facebook and Twitter among many Ole Miss students and alumni with prompting messages such as, "Don't forget to recycle in the Grove this Saturday!"

The second example provided our modeling prompts to a wider audience. On Friday afternoon, during a high traffic time for social media, both Head Coach Hugh Freeze (58,321 Twitter followers as of 11/2013) and Athletic Director Ross Bjork (17,508 Twitter followers as of 11/2013) tweeted reminding people to recycle the following game day. The tweet said, “Don’t forget to recycle in the Grove tomorrow and keep the Grove beautiful! #greengrove.” These two modeling prompts led to the retweets and shares of this status multiple times among many social media users.

Stadium Efforts. Later in the season, it became evident the direct prompt of a game time announcement was not as effective as earlier hypothesized. The prompt was revamped and updated to include modeling prompts in this effort. The photos used to promote the recycling program via social media were then also used for this effort during the game. Rather than the simple recycling logo on the screen, the jumbotron pictured the photos of players and Coach Freeze in the Green Grove shirts. This changed the jumbotron message from a direct prompt to a modeling prompt. Multiple pictures scrolled across the screen and the announcement became more interactive. The change of the jumbotron announcement seemed to connect the effort more directly to the Green Grove Initiative rather than just recycling in general.

Methods using Incentives

Tailgating Efforts. The final method used to change behavior was through the use of incentives, that is the opportunity for fans to gain something from their recycling efforts. The first reward was personal recognition for their recycling. This was offered as fans were “caught being Green Grovers.” Fans were told if they were caught recycling they would be pictured on the Green Grove website and possibly pictured and recognized on the jumbotron during the follow-

ing game. This method offered a chance to gain recognition of outstanding performance in a popular campus-wide effort.

The second incentive involved incentives in the form of a competition with other Southeastern Conference schools. If we were to collect more recyclables than other SEC schools Ole Miss would win the SEC Game Day Challenge. It should be noted that the competition was specifically advertised for beating one school in particular, Louisiana State University. Fans were told, "Let's beat LSU in the SEC Game Day Challenge. Don't forget to RECYCLE Ole Miss fans!" The incentive likely lies in winning against a rival team.

Methods Used Each Game

Game #1 Central Arkansas 6:00 p.m. This first game of the season used basic interventions that may be common place at sporting events. It acted as a pilot game for the rest of the season. Tailgate intervention included education in the Grove and Circle done by 30 volunteers. Standard signs which read "Please Recycle" acted as direct prompts. These signs were placed above recycling bins in high traffic areas throughout the Grove and Circle. Volunteers passed out stickers and cups with the Green Grove logo which also acted as direct prompts. Stadium efforts included signs that read "Please Recycle" above recycling bins inside the stadium.

Game #2 UTEP 6:00p.m. This game used the same education efforts as the previous game. Education was done through 45 volunteers to 53,133 attendees. Again, volunteers passed out the direct prompts of stickers and recyclable cups. Two new direct prompts were added to the already-placed signs for stadium interventions. Game number two had people giving direct verbal prompts outside of the stadium as people entered the game. Additionally, during the third quarter of the game a direct visual and verbal prompt was given to the audience over the sta-

dium's jumbotron. This announcement on the jumbotron had a recycling sign placed on the screen and said, "Hey Fans, don't forget to keep Ole Miss the #1 most beautiful campus. On your way out, please recycle your plastic bottle and cups in the recycling bins located around the stadium. Thank you for your help and remember, go green and go Rebs!"

Game #3 Texas 8:00 p.m. Education and the direct prompts were given out by 40 volunteers to 61,797 attendees. Direct prompting was again used in the stadium with volunteers at the entrances and the jumbotron announcement. The incentives intervention for personal recognition was also used. Fans who were pictured in the Grove or Circle recycling had a chance to be recognized on the jumbotron during the game.

Game #4 Texas A&M 6:00 p.m. This game used the direct prompting of signs used in all games and used education and passing out the direct prompts of stickers and cups by 70 volunteers to the 55,343 people in attendance. In the stadium, direct prompts of volunteers by verbal messages, along with the game time announcement, was used. Personal recognition incentives were given again as the previous game.

Game #5 Auburn 11:21 a.m. Game five removed all interventions except direct/model prompting; there were no volunteers used. Direct prompts of signs were used during the tailgate. In the stadium the direct prompt via jumbotron was used; however, it was combined with pictures making it a modeling prompt as well. This was the first game to use a modeling prompt.

Game # 6 Vanderbilt 6:00 p.m. Game six used every technique and it was the SEC Game Day Challenge. Approximately 200 volunteers were used in education and passing out direct prompts to 57,068 attendees. Signs were used in the tailgate and recycling bags were passed out at every tent. Volunteers stood in front of the stadium as direct prompts and inside the

stadium direct and modeling prompts were used via the jumbotron. Modeling prompts were used before game day through photos and social media. Finally, fans were given personal recognition incentives as well as winning the SEC Game Day Challenge competition.

Game # 7 Mississippi State 6:00 p.m. The only method used in the last game of the season was direct prompting. This was the signs placed in the Grove and Circle every game which read “Please Recycle.”

Table 1

	Game 1	Game 2	Game 3	Game 4	Game 5	Game 6	Game 7
Tailgating efforts							
Education - volunteers	✓	✓	✓	✓		✓	
Direct prompt - signs	✓	✓	✓	✓	✓	✓	✓
Direct prompt - stickers, cups	✓	✓	✓	✓		✓	
Direct prompt - bag at tents						✓	
Stadium efforts							
Direct prompt - volunteers		✓	✓	✓		✓	
Direct prompt - jumbotron		✓	✓	✓	✓	✓	
Modeling - jumbotron					✓	✓	
Combined efforts							

	Game 1	Game 2	Game 3	Game 4	Game 5	Game 6	Game 7
Modeling - photos						✓	
Modeling - social media						✓	
Incentive - personal			✓	✓		✓	
Incentive - team						✓	

Measures

Most of the data for this case study came from the Athletics Department and Landscape Services at the University of Mississippi. Further calculations were done by the Green Grove Coordinator. The attendance, score, game time, and number of volunteers were recorded by the Green Grove Coordinator. The attendance, score, and game times were also given by Ole Miss Athletics. Records of these statistics can be found on the Ole Miss Sports website.

Landscape Services at the University of Mississippi provided the number of trash bags distributed, the total waste collected, the total recycling collected, as well as the recyclables collected in the stadium and tailgate individually. The total diversion rate, recycling per person in the stadium, recycling per person in the tailgate, and total recycling per person was also given by Landscape Services and recalculated by the Green Grove Coordinator. All calculations matched. The diversion rates for the stadium and tailgate were calculated by the Game Day Coordinator.

Recycling per person in the stadium, tailgate, and total (stadium and tailgate combined) was calculated based on the stadium attendance. To calculate these metrics, the pounds of recy-

clables from each area was divided by the number of people in attendance. The tailgate recycling per person plus the stadium recycling per person equaled the total recycling per person.

Diversion rates were calculated to show what percentage of the waste materials was diverted to be recycled. Diversion rates in the tailgate, stadium, and total were calculated by dividing the tons of recycling collected in each area by the total generation (waste+recyclables) of that game. Again, the diversion rates of the stadium and tailgate added together to equal the game's total diversion rate.

Results

Season Totals

Previous football seasons recorded lower amounts of recyclables collected than did our case study. The 2009 season collected 1.8 tons of recyclables, and the 2010 season collected 3.8 tons of recyclables. For the 2011 season no data were recorded. The 2012 season was the season of our case study and a total of 5.6 tons of recyclables was collected.

Case Study - 2012 Football Season

Game #1 Central Arkansas 6:00 p.m. The tailgating education and prompting interventions resulted in a fairly good tailgate diversion rate of 1.13% and 960 pounds of recyclables. The simple stadium effort resulted in a very good diversion rate of .28% and 240 pounds of recyclables. The total diversion rate for game #1 was 1.41% and averaged about 40 pounds of recyclables per volunteer (see Table 2 and Table 3)

Game #2 UTEP 6:00p.m. The tailgating education and prompting interventions resulted in the second highest diversion rate of 1.24% and 1140 pounds of recyclables. The stadium's direct prompt of the jumbotron announcement resulted in a significantly high diversion rate of

0.55% and 500 pounds recycled. The total diversion rate was also the highest for this game with 1.79%.

It often seemed like the team's performance at the time of the announcement affected whether fans were listening/paying attention to the message. It seemed that the better the team was playing, the more attentive fans were to the direct prompt. If the team's performance was poor, the fans tended to ignore the still picture on the screen and grumble among themselves rather than listen to the announcement.

In this game two, the game time announcement looked to be at the optimal time. It was announced towards the end of the game when many people were beginning to leave. The Rebels were also far ahead and fans had good attitudes about the team's performance. So, the happy fans appeared attentive to the timely message and took their bottles to the nearest recycling bin as they left. It is likely these factors are the reason game number two had the highest stadium diversion rate.

Game #3 Texas 8:00 p.m. During this game, the tailgate education and prompting were continued, and a personal recognition incentive for recycling was added. This game resulted in a diversion rate of 1.03% and 1820 pounds of recyclables. With the personal incentive intervention addition, it is notable that this game produced the highest recycling per person rate (in the tailgate) of games thus far and second highest overall with .029 pounds per person. The stadium's direct prompts through volunteers, and the game time announcement, resulted in a .27% diversion rate with 480 pounds of recycling. The total diversion rate for this game was 1.30%.

Game #4 Texas A&M 6:00 p.m. It should be noted the measurements for this game are estimated as scales were out. Numbers were significantly lower than the rest of the season's

games. It is likely they are not accurate estimates. Part of this confusion could have been the heavy rain that made waste and recycling clean up messy and possibly not properly executed. Estimated diversion rates were .3% in the tailgate, .18% in the stadium, and .71% total. These estimated results classified this game as having the lowest rates in all categories. Because the accuracy of the estimates is unknown, the game will not be included in comparisons or discussion.

Game #5 Auburn 11:21 a.m. In the tailgate where only the direct prompting of signs were used, only 800 pounds of recycling was collected, a .5% diversion rate. The stadium also had a low diversion rate of .22% and 360 pounds. Total diversion was .71%.

As mentioned earlier, the players' performance and direction of the game played a major role into how attentive the fans were to the announcement. This game was the first implementation of the revamped message using modeling prompts. From personal observation, the new announcement overall seemed to keep fans' attention more often and longer than the previously used direct prompt.

Game # 6 Vanderbilt 6:00 p.m. (Game Day Challenge). During game number six all intervention methods were used during the tailgate and the game. The game resulted in the highest diversion rates and recycling per person of any game. The stadium scales were out of order, therefore no stadium recycling was used for calculations. However, overall numbers were still the highest for this game. The tailgate diversion rate was 1.52% and 2400 pounds of recyclables was collected. The tailgate also had .04 pounds of recycling collected per person; this was significantly higher than any other game. The tailgate alone produced more recycling than did the tailgate and stadium combined at any other game.

Game # 7 Mississippi State 6:00 p.m. Game seven relied only on the use of direct prompts in the tailgate and had a diversion rate of 1.12% and 1480 pounds of recycling. The stadium's diversion rate was .15% and the total diversion rate was 1.17%, both fairly low rates.

Table 2

	Game 1	Game 2	Game 3	Game 4	Game 5	Game 6	Game 7
Game Stats							
Trash bags	1,725	1,800	2,700	2,250	2,100	1,700	1,500
Attendance	50,544	53,133	61,797	55,343	57,068	60,572	61,005
Score	W 49-27	W 28-10	L 66-31	L 30-27	W 41-20	L 27-26	W 41-24
Volunteers	33	49	40	62	0	200	0
Time	6:00 p.m.	6:00 p.m.	8:00 p.m.	6:00 p.m.	11:21 a.m.	6:00 p.m.	6:00 p.m.
Tailgating Stats							
Pounds recycle	960	1,140	1,820	*500	800	2,400	1,480
Diversion rate	1.13%	1.24%	1.03%	*0.3%	0.5%	1.52%	1.12%
Recycling (lbs)/person	0.019	0.021	0.029	*0.009	0.014	0.04	0.024
Stadium Statistics							
Pounds recycle	240	500	480	*300	360	X	220
Diversion rate	0.28%	0.55%	0.27%	*0.18%	0.22%	X	0.15%
Recycling (lbs)/person	0.005	0.009	0.008	*0.005	0.006	X	0.004

*Scales out, estimate numbers

Highest of the Season

Second Highest

Table 3

	Game 1	Game 2	Game 3	Game 4	Game 5	Game 6	Game7
Total (Tailgate + Stadium)							
Tons of waste	42	45	87	84	81	78	72
Pounds recycle	1,200	1,640	2,300	*800	1,160	2,400	1,700
Diversion rate	1.41%	1.79%	1.3%	*0.47%	0.71%	1.52%	1.17%
Recycling (lbs)/person	0.024	0.013	0.037	*0.014	0.02	0.04	0.028
Recycling (lbs)/volunteer	36.5	33.5	57.5	*12.9	X	12.0	X

*Scales out, estimate numbers

Highest of the Season

Second Highest

Discussion

The purpose of this case study was to create and evaluate various methods for increasing recycling, specifically in the context of tailgating areas and stadiums during university sporting events. The tailgate, stadium and total diversion rates varied widely throughout the season. Games two and six had the highest overall diversion rates, and games five and seven had the lowest overall diversion rates for games with complete data. All the games with complete data had diversions rates above the total for the 2009 season. The total tons of recycling was higher during this season than previously recorded seasons (i.e., 2009 & 2010). Although the case study

does not demonstrate causal relationships between the interventions and recycling, it allows the authors to make some inferences about the most effective methods for future study.

Incentives

The results of this case study suggest that incentives are a good motivator among sports fans for behavior change. For example, the second highest game for recycling per person was at game number three of the season. This game was the first to implement the incentive of personal recognition. This incentive seemed to result in the large increase of recycling per person, specifically in the stadium where it went from $>.022$ pounds per person to $.029$ pounds per person. This was the highest stadium recycling per person of any game.

Similarly, game six was the first implementation of the competition incentive. This game was leading in recycling per person and tailgate diversion rates. Through personal observation, it seemed as though fans were most motivated by this incentive. It appeared that fans not normally concerned with recycling became concerned when there was a possibility of beating the rival team.

More is Better

This case study suggests that no intervention alone is extremely effective in changing behavior, but rather a combination of methods produces the largest increase in recycling. The games that used the most interventions produced higher recycling to waste diversion rates than games with fewer interventions. For example, game six used all 11 intervention methods and saw the first implementation of recycling bags at each tent, modeling prompts, and a competition incentive. Recycling bags at each tent made tailgate recycling more convenient, and the

model prompts and competition seemed to spark interest. A combination of all these interventions appeared to have resulted in the high recycling rates.

Education and prompts

Previous research tends to suggest that the method of education is not “alone” effective (e.g., Gardener, 1986; Hopper, 1981). Though this research supported findings that education is most effective when combined with other interventions, results of education should not be ruled out in effectiveness. For example, after education volunteers had been used in all previous games, they were removed in game five of the season. Some interventions, such as direct prompts, were still used; however, without the intervention of education, diversion rates dropped from >1.02 to only .5% at game number five. Diversion rates were the second lowest in game number seven where education was also not used. Therefore, though education is a basic behavior change method, the results imply that its value should not be disregarded.

Limitations

Case Study verse Research. As with any case study, this evaluation does not demonstrate experimental control. That is, this evaluation does not establish whether the interventions were a direct result of the observed changes. It is possible that factors outside of the Green Grove Initiatives could have led to the increase in recycling during the 2012 football season.

Despite this, it is likely that the interventions increased recycling. The 2009 football season collected 1.8 tons of recyclables with a diversion rate of only .5%. When recycling efforts started the following season in 2010, 3.8 tons of recycling was collected. Future investigation may wish to use time-series research design elements to demonstrate a relationship between the

initiatives and recycling. For example, researchers could use alternating treatment designs where some initiatives systemically vary by game.

Contextual Factors. Limitations for this case study include many contextual factors of the game not controlled by researchers. One instance of this includes the team's performance, which may affect the fans in ways that impact their recycling. This can also include factors such as weather on game days or the time of the game. All of these factors can affect peoples' recycling behavior, but cannot be accounted for in the current case study. For example, in game number five it rained throughout the day and during waste and recycling clean up. The rain caused dumpster and recycling areas to be messy with mud and some trash was consumed in the flowing water. Waste and recycling products could have possibly been mixed. This could have also affected the estimated measurements for that game.

Data Availability. Another major limitation and set back in this study was when recyclables were unable to be measured accurately. Many of the metrics required the involvement of others, including Landscape Services, rather than the researcher. So when scales were out, as in games five and seven, there were no results to examine. Game number five had so many estimated statistics that it was thrown out as irrelevant.

Similarly, Landscape Services only reported the total amount of waste for the game. Though individual tailgate and stadium recycling rates were given, waste was only given as a total generation. So, in calculating diversion rates, the total generation was used. More precise measurements could be calculated if waste was measured in the stadium and tailgate separately. This would likely produce results more varied and therefore provide a potential area of focus for recycling efforts.

Funding. A final limitation to this research includes the available funding to provide interventions. For example, placing recycling bags at each tent seemed to be particularly effective at making recycling more convenient. This was only performed at one game, however, because the recycling bags are expensive and time consuming for Landscape Service's staff to distribute. Funding also affects the quantity of direct prompts used and even the number of recycling bins.

Future Efforts

Improving Education. Though much research has already been done about education as a method of behavior change, this is not the case for such university sporting events. In this research education proved useful. Testing different methods of education could increase its value in behavior change. Education could not only be done by volunteers, but in classrooms, in campus offices, and among alumni. Additionally, education should be spread prior to the game and not just on game days.

Improving Education Through Volunteers. It was hypothesized that a greater number of education volunteers would produce a greater amount of recycling; however, this was not always the case. For example, game number three had fewer volunteers than game number two, but more recycling was collected. When the recycling per volunteer was calculated, the results greatly varied with seemingly no consistency. This suggests that the number of volunteers does not necessarily have a major effect, but rather some groups of volunteers have more effect than others. For example, game number one and game number three had roughly the same number of volunteers (i.e., game one: 33, game three: 40). Game three collected 57.5 pounds of recycling per volunteer, while game one collected only 36.5 pounds per volunteer. This suggests that the education volunteers at game three were possibly more effective than those at game one. Future

efforts could explore the idea that education should not necessarily have a goal of quantity, but possibly rather one of quality.

Target Groups. Another future effort could be efforts aimed at target groups rather than the entire game day population. For example, a large population at these sporting events are families and children. An incentive method for children would more than likely motivate not only them to recycle, but their families as well. Other target groups could be Greek life students, regional areas, and involved alumni. This could possibly result in a big behavior change of small groups, rather than a small behavior change in the large overall group.

Implications for the Future

This case study provides methods to increase recycling at large university sporting events. Building off of these efforts, changing them, and adding to them provides a foundation and directions for future efforts. The success of such recycling programs is evident; thus, the funding and support of such programs is likely to continue for further research efforts. This case study also shows the importance of help from university offices such as Athletics and Landscape Services.

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