
Design Considerations for Creating Game-Based Social Experiments

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CHI 2015, April 18-23, 2015, Seoul, Republic of Korea.
ACM 978-1-4503-3145-6/15/04.

Abstract

In this paper, we explore the topic of games as research methods, which has received little attention and has much promise. More specifically, our aim is to provide insight into what design considerations are made for creating game-based social experiments. In order to achieve this, we discuss our experiences of translating a traditional experiment focused on the decoy effect into a game-based experiment. Our preliminary results suggest that monetary incentives with no real-world consequences can affect behavior even when time delays with real-world consequences were a competing factor. This has implications for how research can be gamified.

Author Keywords

games as research method; social experiments; game design; citizen science; crowdsourcing.

ACM Classification Keywords

H.5.m. [Information Interfaces and Presentation (e.g. HCI)]: Miscellaneous; I.6.8. [Simulation and Modeling]: Types of Simulation—*Gaming*; K.4.m. [Computers and Society]: Miscellaneous

Introduction

Games have increasingly become a tool for researchers [1]; however, using *games as research method* has received far



Figure 1: Choosing existing characters or creating new ones with the character creator tool.



Figure 2: Manipulating the conditions for creating an experiment with the manipulator.

less attention in the past decade than their use for impact. The fundamental difference between both possible uses is that the former is used by the researcher to observe behavior, whereas with the latter the intent is to change behavior. With “games as research method,” a game is used as the particular form or procedure for obtaining observations instead of surveys or laboratory experiments; on the other hand, with “games for impact,” a game is used as an intervention to solve a problem or achieve objectives (e.g., education, persuasion) instead of lectures or workshops [4]. A useful way to distinguish between the two is that the focus for games for impact is on the person or system “to-be”: the goal is to *change* behavior. For games as research method the focus is on the person or system “as-is”: the goal is to study *existing* behavior.

Some scholars purposefully incorporate both uses [7]. However, the purpose of each use is significantly different and designers will need to make different considerations that will either emphasize the use as research method or for impact [5]. For example, for research, it may not be desirable to provide immediate feedback as this could influence subsequent behavior. In contrast, from designing a game for impact such behavior change may be necessary.

In this paper, we aim to dedicate more attention to the topic of games as research methods. A number of scholars have used gameful environments for research successfully [1] and a special issue has been dedicated to the subject too [2]; however, to our knowledge few have elaborated on the *design considerations* in gamifying research. It is our intention to provide more insight into such design considerations through our experiences of creating game-based social experiments in *Mad Science*, which is still in its development phase. Once the game is completed, players will be able to create their own

experiments and to participate in other researchers’ experiments. However, to begin testing impacts of our design decisions, several playable scenarios have been created to attempt to replicate previous research findings.

Although we developed a number of experiments using *Mad Science*, we will specifically focus on the (re-)development of one experiment. This experiment is a replication of an existing experiment based on the well-known phenomenon of the *decoy effect* [6]. Before we discuss this experiment in detail, we will describe the concept of *Mad Science* and how it distinguishes from related work on using games as research method. Our work contributes to HCI in thinking on how gamification can help support research activities, and specifically in thinking what it takes to translate typical laboratory experiments to a game-based variant.

Concept of Mad Science

With regards to the use as research method, games have predominantly been used to study physiological traits, such as eye-hand coordination and visual attention [3]. With the emergence of gamification, scholars are more recently considering how to apply game techniques to traditional research methods, such as surveys. Then, game-like environments have been used for years to study behavior by a few scholars but mostly also in physical laboratory settings [1]. The game *Mad Science* differs from this related work in that it is accessible on any mobile device or browser. It is further based on experimenting with social interactions, hence why we refer to the experiments as *social experiments*.

In terms of its concept, *Mad Science* is a digital game where players join the corporation Mad Science, Inc. as one of their new “mad” scientists—people who are



Figure 3: Decoy experiment with three boats for purchase. Below are the options offered to players.

1. Will cost \$25,000.00 and will take 30 seconds to build.
2. Will cost \$50,000.00 and will take 20 seconds to build.
3. (a) Will cost \$30,000.00 and will take 31 seconds to build.
(b) Will cost \$55,000.00 and will take 21 seconds to build.

intrinsically curious and show that curiosity in every aspect of their behavior. Mad Science Inc.'s mission is to "understand why people do what they do." Players have to learn to use the corporation's proprietary machinery to study human behavior, such as a character creator, object creator, and a manipulator (i.e., for creating research conditions). Once players are familiar with the tools, they can go to Mad World, a world where players can design and perform research, participate in the research of other players, and share effective strategies.

Our long-term goal is to accomplish through Mad Science what we have coined "participatory crowdsourced research." This term refers to having large numbers of players authentically and collaboratively participate in creating and experiencing scientific research. For the game to be successful, a crucial requirement is that it teaches players how to perform research. Therefore, *Mad Science* is an example of a game that is both used for research as well as for impact.

Design Considerations for the Decoy Effect

One of the experiments we developed was with the aim to replicate the decoy effect, which is a decision bias that has been supported by prior studies [6]. The decoy effect describes the tendency of preferences between two options (e.g., two different cars) to be affected by a third, asymmetrically dominated option. Asymmetrical dominance occurs when the third option is better than one alternative but is clearly worse than the other alternative. For example, buyers will not buy a large popcorn of \$7 if a small popcorn of \$3 is offered; however, if a medium is offered for \$5.50, then suddenly more people will buy the large. The medium serves in this example as the decoy.

To replicate this experiment seemed non-trivial. One

design problem we considered is how to make players feel the consequences of their decisions. With the popcorn example participants were actually spending money. Therefore, in making decisions, they will consider the consequences of spending their money. We were concerned that this may not be replicated with fictitious currency because spending such money has no consequences on the players themselves. We decided to use real time delays in addition to fictitious currency as time delays have real-world consequences.

In the first iteration of the experiment, participants were advised that they would receive \$100,000 when they arrived at Mad World (the island where they would be able to conduct their own research in the future). Currently, players are unable to access Mad World thus the \$100,000 is completely fictitious currency. Players entered a boathouse and were required to interact with a Non-Player Character (NPC), a character controlled by no human player. Players were given three options for boats that could be used to get them to Mad World. Each boat had an associated cost (in-game currency) and an amount of time to build (real time delays). Players were required to wait for the entire time, associated with their choice, to elapse before progressing to the final scenario. The first two options were the same for every participant. The third option randomly varied between participants. The third option varied in order to change which of the other two options asymmetrically dominated it.

As part of a classroom exercise, 99 students participated in this experiment. It turned out that in both conditions the least expensive Option 1 was preferred [8]. Although we were not able to replicate the decoy effect, the results suggest that participant decisions were under the control of the fictitious money stimulus. This is an interesting

finding because the money has no real-world consequence but the time delay does have a real world consequence.

We considered that replication did not happen due to small differences in the amount of time required to build. Therefore, in our next iteration we multiplied the time delay by 10, increasing the delays to minimally 200 seconds. Interestingly enough, we observed in another classroom exercise with 59 students that players still preferred Option 1 in both conditions. However, players were more frustrated in playing this exercise. Other than that players are biased by the money stimulus, the increased time delay increased player frustration, which should be of concern to designers as player retention and engagement are important.

Conclusion

Blascovich and Bailenson [1] argue that, for the most part, individuals do behave similarly in both virtual and real environments, but that researchers must be cautious because situations may differ in ways not previously considered. Our experience and results can attest that assertion. Based on this work, further caution is necessitated for game-based environments because engagement is a factor that is added on top of other design considerations, especially if participation is voluntary. Although our preliminary work does not provide conclusive answers, it does suggest that monetary incentives with no real-world consequences can affect behavior even when time delays with real-world consequences are a competing factor. This may actually be an example of real world human behavior because it might just be that people have a harder time with evaluating time than money. Further research will consider other designs and provide additional insights into how we can create game-based social experiments.

Acknowledgements

We thank our students Nolan Manning, Yuyang Zhao, and Huichen Guan for realizing our vision. We further thank the College of Arts, Media & Design and Northeastern University for funding this project.

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