Designing and Researching Games to Reduce Stereotypes and Biases: A Psychological Approach

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Abstract: The workshop gave audience members a first-hand perspective on the psychological approach employed by Tiltfactor Laboratory to create and study games to reduce stereotypes and social biases. Participants played *Buffalo* and *Awkward Moment*, two card games created by Tiltfactor as part of a National Science Foundation-funded project addressing gender stereotypes in science, technology, engineering, and math (STEM), and completed sample post-game assessment materials used in recent experimental studies. Following game play, the presenters facilitated a thorough debriefing to explain the psychological foundation of the games' designs, the means by which the games combat stereotypes and bias, and the preliminary results from completed research involving both games. The session closed with a general discussion centering on the challenges and rewards of conducting rigorous, controlled research to test the efficacy of games, as well as the value of utilizing a cross-disciplinary approach to game design and research.

Introduction

Tiltfactor Laboratory (http://www.tiltfactor.org) is a design studio dedicated to creating games for social change. We design, study, and launch games, across a variety of digital and non-digital platforms, that use psychological principles to promote learning and fundamental human values. Our team investigates topics such as perspective-taking, empathy, and motivation, to create profound experiences that make a difference in people's lives. To illustrate, we are currently producing games that aim to combat biases and stereotypes against women in science, technology, engineering, and math (STEM) domains; facilitate open-source metadata gathering for public institutions; encourage altruism and prosocial behavior via social networks; and inspire new ways of thinking about public health and health care delivery.

We employ a psychological approach in our iterative game design process and in both the informal testing and formal assessment of our games. We rely primarily on systematic *experimental* studies (incorporating both quantitative and qualitative research methods) to test the efficacy of a game at achieving its intended cognitive, affective, or behavioral outcomes as well as to investigate broader questions about the phenomenological experience and subsequent psychological impact of games and play.

This workshop provided audience members a first-hand perspective on Tiltfactor's design and research process, particularly the team's efforts to create games to reduce stereotypes and biases. Our work takes it place alongside recent initiatives in the GLS community, in games such as *Fair Play* (Paiz-Ramirez et al., 2012; see also Devane & Squire, 2008), that have examined the impact of pervasive biases and stereotypes on learning and performance.

What are best practices in game design to combat bias? How can researchers select and implement reliable measures to assess a game's impact? How can designers ensure their games can be both fun and impactful? How can we understand the impact of social biases on learning and social interactions? To broach these questions and spark a meaningful dialogue, the workshop focused on the design and research processes for the Tiltfactor games *Buffalo* and *Awkward Moment* (Flanagan, 2012). Created as part of a National Science Foundation-funded project, entitled "Transforming STEM for Women and Girls: Reworking Stereotypes and Bias," both games employ mechanics and content that were informed by psychological theories on stereotypes and social cognition.

Background

The need for greater representation of women and people of lower socioeconomic status in STEM courses, majors, and careers in the United States is indisputable. Although women constitute 46.5% of the US workforce, they hold only 25% of all math/computer science jobs and 14% of engineering jobs (U.S. Department of Labor, 2013). The numbers for people of color and those from lower socioeconomic groups are similarly sobering; for example, according to recent statistics, African Americans and Hispanics held only 6.2% and 5.3% of all STEM occupations respectively (Babeo & Ellis, 2007; see also Ingels et al., 2011). Social and psychological factors, particularly the prevalence of negative stereotypes toward underrepresented group members' abilities in STEM, have been cited as the central causes of this imbalanced participation in STEM careers (see Hill, Corbett, & St. Rose, 2010 for a

review). The perpetuation of these stereotypes creates a set of motivational barriers that explain – and perpetuate – this imbalanced level of participation in STEM fields. Among the most destructive of these barriers are underrepresented groups' experience of *stereotype threat* and the formation of *implicit (i.e., unconscious) bias* against STEM. Combating these powerful psychological obstacles is central to shifting societal attitudes, beliefs, and behaviors in order to open up STEM learning for all.

Stereotype Threat

Stereotype threat describes the anxiety or concern that arises in a situation in which a person has the potential to confirm a negative stereotype about his/her group: this anxiety can profoundly disrupt the performance of an individual who identifies with that group or domain (Steele & Aronson, 1995). Specifically, stereotype threat activates physiological stress responses, encourages excessive performance monitoring, and instigates the attempt to mentally suppress thoughts of self-doubt, all of which deplete cognitive resources during a task or performance (Schmader, Johns, & Forbes, 2008). Likewise, the experience of threat may hinder individuals' flexibility in problem-solving (Carr & Steele, 2009), and activate failure-avoidance goals and worry (Brodish & Devine, 2009).

At the same time, research has revealed many effective means of reducing stereotype threat and counteracting its negative effects on performance and persistence, such as:

- Actively negating or dismissing an activated stereotype (Kawakami et al., 2000)
- Affirming a positive aspect of one's identity to counteract the activation of a negative stereotype (Logel et al., 2009; Martens et al., 2006; Rydell, McConnell, & Beilock 2009)
- Reframing a stereotype-relevant task as a challenge rather than a threat and emphasizing how the task can be an enjoyable way to gain knowledge or build skills rather than how it can be a way for individuals to show their inherent talent or ability (Alter et al., 2010)
- Adopting a *growth mindset* to anticipate improvement in a particular domain through persistence and practice (Aronson, Fried, & Good, 2002)

Implicit Bias

Implicit bias describes an unconscious and automatic negative association that is incorporated in one's mental representation of a particular social group or domain as a result of the prevalence of stereotypes in the social environment (Greenwald & Banaji, 1995; Greenwald & Farnham, 2000). In STEM domains, for example, girls and women may harbor a strong implicit association between "math" and "negative" or a stronger implicit association between "math" and "male" than between "math" and "female," even if they are not consciously aware of such representations and, moreover, even if they have a positive attitude toward math at the explicit level (Nosek, Banaji, & Greenwald, 2002).

Combating implicit bias requires targeting the automatic association and either changing it (e.g., retraining the mind and "automatizing" a new association through repetition) or making people aware of the often unrecognized impact that implicit bias can have on their perceptions, judgments, interpretations, attitudes, and behaviors. Among the most successful techniques for reducing implicit bias that have been validated by empirical investigation include:

- Exposing individuals to positive role models from a stereotyped group (e.g., successful female mathematicians or scientists: Blair, Ma, & Lenton, 2001; Stout, Dasgupta, Hunsinger, & McManus, 2011)
- Repeatedly negating an activated stereotype (Kawakami et al., 2000) or reinforcing one's goals to be egalitarian in one's views of social groups (Moskowitz & Li, 2011)

Workshop Overview

After a brief introduction, we conducted an informal simulation of the experimental procedures we previously employed in research on *Buffalo* and *Awkward Moment*, both of which aim to address the psychological obstacles of stereotype threat and implicit bias in the context of a fun, immersive party game experience. Participants played the games with five to seven other audience members and also completed individual assessment items on a paper-and-pencil questionnaire for each game. After both game play and assessment cycles, we led an interactive debriefing session, during which we shared more information about the design of the games, the means by which they aim to decrease stereotypes and biases, and the preliminary results from recently completed research. The session closed with a general discussion of the challenges and rewards – and we argue, the *necessity* – of

conducting rigorous, controlled research to test the effects (and effectiveness) of games, as well as the value of utilizing a cross-disciplinary approach to game design and research.

Phase 1: Game Play and Assessment (30 minutes)

To begin the workshop, audience members played *Buffalo* and *Awkward Moment* and completed a sample of the assessment items used in recent Tiltfactor research on both games. To simulate the experimental conditions used in this research, groups of participants were assigned to play either "bias-relevant" versions of the games (with content addressing occurrences of bias, particularly gender bias in STEM) or "neutral" versions (whose content did not address bias). The assessment items, which were administered in paper-and-pencil questionnaires, consisted of both previously validated psychological measures of stereotypes and biases as well as original measures created by Tiltfactor team.

Game Descriptions

Buffalo. In *Buffalo*, a game designed for teenagers and adults, players simultaneously flip cards from two decks. One deck contains cards that list adjectives on them, including ones based on age (e.g., *young, old*), race (e.g., *Hispanic*, *Caucasian*, *multiracial*), physicality (e.g., *tall*, *unattractive*, *blond*), personality (e.g., *strong*, *corrupt*, *funny*), and ideology (e.g., *spiritual, eco-friendly*). The other deck contains cards listing nouns, including ones based on profession (e.g., *scientist*, *supermodel*, *talk show host*), role (e.g., *grandparent*, *superhero*), and organizational affiliation (e.g., *environmentalist*, *feminist*). Using the noun-adjective combination formed by the cards drawn, players race to collect the cards by identifying a real-life person or fictional character whose identity satisfies both words shown (see Figure 1).

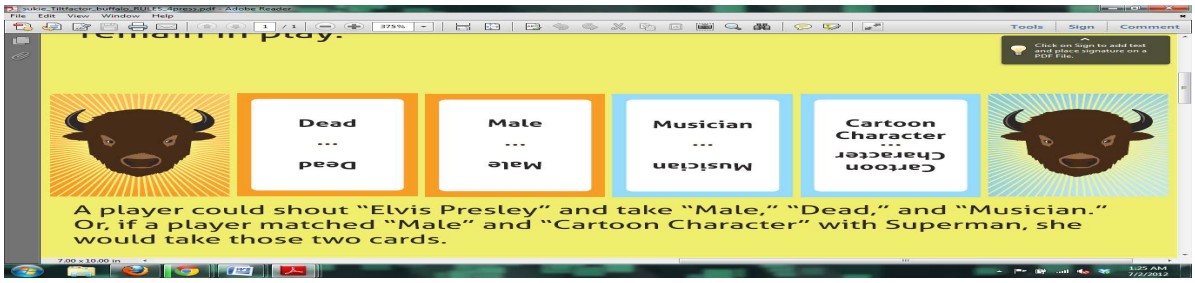

Figure 1: Sample adjective cards and noun cards from *Buffalo*. With the cards displayed, a player could win the "Male" and "Musician" cards by shouting out, "Justin Bieber."

The game activates a plethora of cross-cutting identities, some of which may fit with stereotypes and are thus easier to come up with (e.g., a "*male scientist*" or "*greedy CEO*"), whereas others may defy players' preconceptions of a category and thus be more difficult to name (e.g., a "*female scientist*" or "*saintly CEO*"). By exposing players to descriptor combinations that may or may not be consistent with common stereotypes, the game can facilitate sophisticated thought and discussion about the ways that individuals' perceptions can be influenced by prior associations and expectations.

Awkward Moment. In *Awkward Moment*, a game designed for middle school students, players begin with a hand of five "Reaction Cards" (see Figure 2); these cards describe potential responses to the game's "awkward moments," including actions (e.g., "Scream your head off," "Write a blog post about it," "Talk it out"), exclamations (e.g., "Rats!" "OMG," "No way!"), and frames of mind (e.g., "Get serious," "Relax," "Channel your inner warrior"). During each round, one player serves as the "Decider" and draws a "Moment Card" (see Figure 2) that poses a hypothetical situation (e.g., "Somebody hacks your Facebook account and changes your status to 'Girls are stupid.'"). The other players then respond to the drawn Moment Card by submitting a Reaction Card from their hands face-down to the Decider. The Decider then reads each of the submitted cards and selects a winner for the round. The game aims to stimulate thought and discussion about responses to social and academic dilemmas, particularly situations that involve bias against girls and women in STEM. Many of the cards in the Moment deck present situations in which a female is a target of stereotypes. In some situations, players imagine *being* a target themselves.

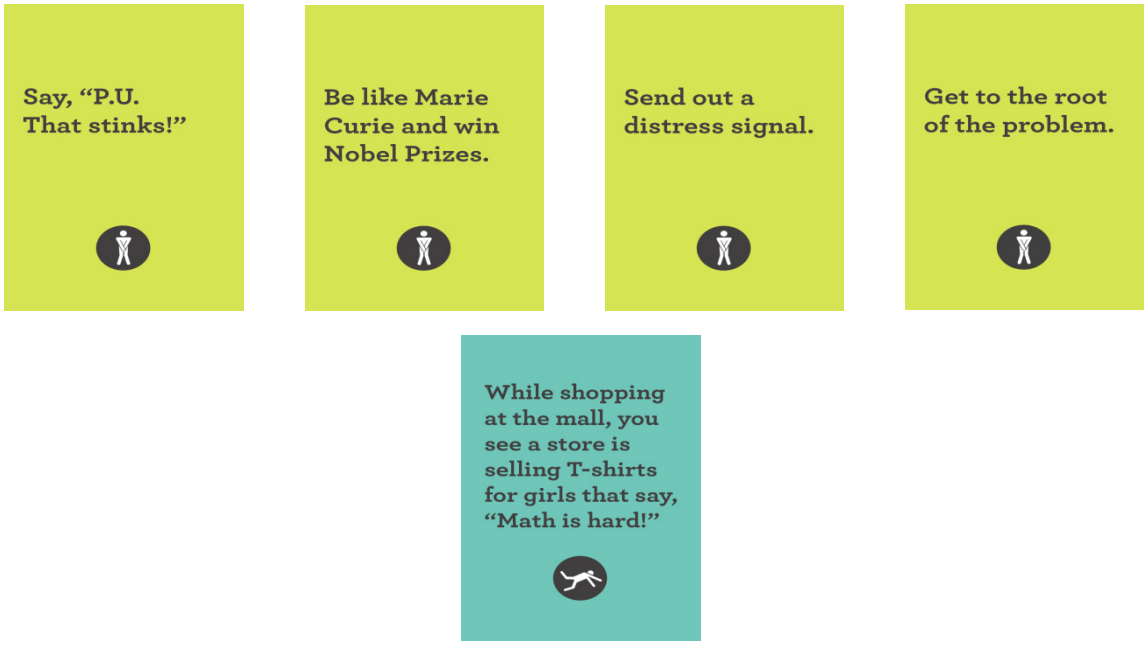

Figure 2: Sample Reaction Cards (top) and Moment Card (bottom) from *Awkward Moment*.

Assessment Measures

After playing *Awkward Moment*, participants completed two key measures: (1) a Tiltfactor-devised instrument assessing gender bias in STEM that presented respondents with a set of photographs of six individuals (3 female, 3 male), identified as new game characters, and asked them to assign a list of occupations (including *scientist*) to them and (2) a validated measure of perspective-taking assessing respondents' adoption of an other-oriented point-of-view, including the task of drawing a capital letter E on one's forehead (the orientation of which indicates either a self-directed or other-directed vantage point: see Galinsky et al., 2006; Hass, 1984). Likewise, following *Buffalo* game play, participants completed previously validated scales measuring respondents' level of *universal orientation*, a psychological construct corresponding to general non-prejudice (Phillips & Ziller, 1997) and *motivation to avoid prejudice*, the desire to recognize and control bias in one's own judgments and actions (Plant & Devine, 1998).

Phase 2: Debriefing (15 minutes)

Following the game play and assessment period, we provided an overview of Tiltfactor's efforts to create and study games for social change explained the psychological principles and theories that informed the design of both *Buffalo* and *Awkward Moment*, including the key concepts of stereotype threat and implicit bias. In addition, we discussed the means by which the assessment items aim to measure respondents' levels of stereotypes and bias. Finally, we presented the preliminary results from recently conducted studies that revealed that: (1) *Buffalo* significantly increased participants' perceptions of the diversity of their self-identified social ingroups and decreased category-based social judgments; (2) *Awkward Moment* significantly increased players' association between "female" and "scientist" and inspired greater assertiveness in response to hypothetical occurrences of bias; and (3) framing the games explicitly as ones dealing with social stereotypes (versus framing the games as ones dealing with social *situations* or *knowledge*) reduced players' enjoyment and limited the games' effectiveness as tools to reduce bias.

Phase 3: General Discussion (15 minutes)

The session closed with an interactive discussion/question-and-answer period, focusing on the challenges and rewards of taking a psychological approach to game design and research. We presented a number of games that have aimed to tackle stereotyped and bias and invited audience members to share their own game designs and research experiences, insights, and approaches. We offered insights from our lab's design work and research that have revealed that games that aim to tackle a stereotype-relevant task or domain – in particular, spatial reasoning skills among female players – can actually backfire and *increase* stereotype threat if the game is not designed in an approachable and accessible way to scaffold learning appropriately – or if the game itself is explicitly framed as one that is relevant to spatial performance, Next, we discussed the importance of developing and deploying appropriate cross-disciplinary research methods to test the efficacy of games for achieving their desired impacts.

The final section of the discussion centered on the importance of recognizing the potential for bias to emerge in games and play contexts, and the need for designers and researchers to be mindful of games' content, mechanic, and frame, as well as the way games are perceived and experienced by diverse player groups. The disc

About the Presenters

Dr. Mary Flanagan, founding director of Tiltfactor, is a scholar and researcher focused on how people create and use technology. Her explorations across the arts, humanities, and sciences emphasize the use of methods and tools that bind research with introspective cultural production. She is particularly interested in exploring issues of equity and authorship in technological environments and reworking commonly understood paradigms to provide collective strategies for social change. In 2003, Flanagan created Tiltfactor as a rigorous theory/practice laboratory devoted to the investigation and creation of games and play. Flanagan has written more than 20 critical essays and chapters on games, empathy, gender and digital representation, art and technology, and responsible design. Her three books in English include the recent *Critical Play* (2009) with MIT Press. As an artist, her internationally exhibited work ranges from game-inspired systems to computer viruses, embodied interfaces to interactive texts. She is the Sherman Fairchild Distinguished Professor in Digital Humanities at Dartmouth College. **http://www.maryflanagan.com**

Dr. Geoff Kaufman is a postdoctoral researcher in psychology at Tiltfactor and the inaugural scholar-in-residence at Dartmouth College's Office of Pluralism and Leadership. He holds a Ph.D. and M.A. in psychology from Ohio State University, and a B.A. in psychology from Carnegie Mellon University. His research focuses on how *experience-taking* – the mental simulation of characters' experiences in fictional narratives, virtual worlds, or games – can change individuals' self-concepts, attitudes, behaviors, and emotions (Kaufman & Libby, 2012). He has investigated how such experiences can build interpersonal understanding and empathy, reduce stereotypes and prejudice, and inspire higher levels of social consciousness.

Cote Theriault is a former research assistant at Tiltfactor and a M.A. candidate in the Applied Developmental and Educational Psychology program at the Lynch School of Education at Boston College. She earned a B.A. in psychology with a minor in human development and education from Dartmouth College in June 2013. At Dartmouth, her research focused on the impact of framing on game play and cognitive performance related to Science, Technology, Engineering, and Mathematics (STEM). Her current research interests include the ways in which various features of board games facilitate the math development of young children.

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