



## Points, stories, worlds, and diegesis: Comparing player experiences in two citizen science games



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### ABSTRACT

We conducted an experiment to examine how people perceive differences between points-based and story-based gamification approaches. We were interested in how these differences impact peoples' play experiences and perceptions of working on a citizen science task.

Our findings show that the story-based game, Forgotten Island, was strongly preferred over the points-based game, Happy Match. Participants indicated that this was because of "diegesis" in Forgotten Island – in other words, a focus on story-motivated activities and rewards made the citizen science task more enjoyable and gave participants various reasons to continue play.

This study suggests that story-based games can be a powerful tool for attracting participants to citizen science tasks. In particular, compared to point-based games, story-based games may be more useful for attracting and engaging participants who are ambivalent about scientific inquiry. This paper also discusses some of the challenges and possibilities for both points-based and story-based gamification.

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### 1. Introduction

In recent years, the term "crowdsourcing" has emerged to describe information systems that distribute work or tasks amongst large groups of people. Existing crowdsourcing systems address a wide variety of commercial, educational, and scientific tasks. In this present study we direct our interest toward "citizen science" systems, information systems that support crowdsourced involvement of non-scientist members of the general public in scientific inquiry (Cohn, 2008; Wiggins & Crowston, 2011).

One important challenge of instantiating a citizen science system is the need to recruit and retain participants, i.e. to attract a crowd. Yet citizen science tasks can sometimes be mundane or repetitive, and they may also be complex or require specialized participant training and knowledge. Project participants are human beings, not simply organic CPUs, so making challenging scientific tasks interesting, worthwhile, and achievable is critical for any successful citizen science system (Franzoni & Sauermann, 2014; von Ahn, 2006).

There are many approaches to attracting a crowd of volunteers to participate in citizen science project, including community

building, competitions, reward systems, and more. In this research, we are interested in so-called "games with a purpose" (von Ahn, 2006), also sometimes referred to as "gamification." This is the notion of turning non-play activities into games (Deterding, Dixon, Khaled, & Nacke, 2011; Deterding, Sicart, Nacke, O'Hara, & Dixon, 2011; von Ahn, 2006; von Ahn & Dabbish, 2008). In the citizen science context, games with a purpose merge scientific tasks with engaging game elements. Yet entertainment game players value games for the fun, interesting, and rewarding experiences they provide (Schell, 2008). With this in mind, we are most interested in how games with a purpose can attract volunteers who have limited enthusiasm for helping scientists or working on the underlying science task. That is, we are interested in people who would not normally think of themselves as "citizen scientists." We are interested in this because well-designed citizen science games with a purpose have the potential to attract large crowds of helpful volunteers, even in circumstances where the science task is difficult or uninteresting (Flatla, Gutwin, Nacke, Bateman, & Mandryk, 2011).

The current enthusiasm for gamification and games with a purpose sometimes overlooks a fundamental issue: what is a "well-designed" game with a purpose? There are many different motivational techniques that can be employed when designing games (Chen & Chen, 2013), and many different philosophies about what a game really is (Rogers, 2010; Salen & Zimmerman, 2004; Schell, 2008). Games can be heavily mechanic-oriented, or focus

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more on stories or characters. Games can be framed around high scores and points, or around imagined, fictional experiences. Some researchers evangelize about the great potential and benefits of games with a purpose (e.g., McGonigal, 2011; von Ahn, 2006), while others argue that current gamification techniques are flawed, even immoral, mechanisms for tricking participants into doing work (e.g., Bogost, 2011).

Many – perhaps most – games with a purpose in the citizen science domain rely upon techniques such as points, scores, badges, and achievements to motivate and engage players (Bogost, 2011). In contrast, commercially available entertainment games, especially those targeted toward enthusiast rather than casual gamers, frequently stress in-depth storytelling, immersive game worlds, and rich visual and aural experiences.

Questions result: given the popularity of stories in commercial entertainment video games, why do so few citizen science games take advantage of story-oriented design elements? Moreover, how might games designed around story features also engage participants in purposeful activities? Can such games attract volunteers who would not normally involve themselves in a citizen science project?

In this present research, we ran a controlled study of player experiences in two citizen science games with the goal of addressing some of these questions. The first game, *Happy Match*, is a points-driven quiz game, similar to many currently published citizen science games. The second, *Forgotten Island*, is a story-driven, exploration-oriented game that differs from the mainstream of citizen science gaming in many respects.

*Happy Match* and *Forgotten Island* are part of an ongoing citizen science research project called *Citizen Sort*,<sup>1</sup> and were built to study player experiences in the context of citizen science games with a purpose. Our literature review, experimental results, analysis, and discussion unpack some of the most important themes and concepts that came out of our exploration of points vs. story-oriented gaming, purposeful game design, task design, and the player experience.

## 2. Literature review

### 2.1. Points and gamification

The popular but controversial term “gamification” is relevant to our work, not the least because points-based games are, in many ways, gamified tasks first, and play experiences second. However, this term is laden with rhetorical baggage, with some even likening gamification to “exploitationware” (Bogost, 2011). This criticism is directed toward games where players undertake tasks in exchange for a score, a badge, experience points (XP), or similar; but if a player is earning points for undertaking some activity, he or she must be playing a game, right?

The critics of score-driven activities argue that points, badges, and the like are not gameplay. Rather, these are metrics by which really meaningful interactions – the *experiences* that truly engage and delight players – are measured and progress is recorded. To remove the meaningful aspects of play while retaining the measurement system is to produce something that is not really a game at all (Bogost, 2011; Deterding, 2012; Deterding, Dixon, et al., 2011; Deterding, Sicart, et al., 2011; Salen & Zimmerman, 2004). Bogost (2011), in particular, levels harsh criticism at such games: “Like having a website or a social media strategy, ‘gamification’ allows organizations to tick the games box without fuss. Just add badges! Just add leaderboards!”

Yet various researchers have fielded a variety of highly successful, very engaging citizen science games that do adopt point, badge,

achievement, and leaderboard approaches. These include games for language acquisition and translation (Duolingo<sup>2</sup>), simulated protein string folding (Fold.It<sup>3</sup>), simulated genetic sequencing (Phylo<sup>4</sup>), analyzing historical records (Old Weather<sup>5</sup>), and mapping neural pathways in the brain (EyeWire<sup>6</sup>) among others. Participation levels vary, but these examples have all attracted considerable numbers of voluntary players. Clearly, something about these experiences – perhaps a social experience or the activity itself – provides real meaning, at least for some.

Since our objective is to probe the differences between points-based science activities that feel “gamified” and story-based science activities that may or may not fit this controversial label, we favor von Ahn’s (2006) broader term “games with a purpose” (and a variation, “purposeful games”). These accommodate many variations on merging games and tasks, including both points-based “gamification” and other approaches. von Ahn’s (2006) term permits us to think of points and stories as related but distinct mechanisms for convincing players to become participants of citizen science projects.

### 2.2. Stories and diegesis

The term “diegesis” is an important way of thinking about stories within games. It refers to the notion of the “story world” vs. the “real world” (De Freitas & Oliver, 2006; Galloway, 2006; Stam, Burgoyne, & Flitterman-Lewis, 1992). Diegesis is most easily understood through an example: the label on a treasure chest found by a game player.

Deeply etched into cracked wood by a rough hand and a dull knife, the misspelled word “Tresur” is suggestive of the former owner of the chest – perhaps a vicious and unlettered pirate, perhaps a highwayman or bandit. This is a diegetic label. The handwriting, the texture of the letters, the knife scrapes, and the misspelling all elaborate upon the game world and story.

A non-diegetic alternative might be cleanly printed white text, Helvetica font, hovering in space over the chest, rotating to always face the player’s POV. This label is part of the game’s GUI, not the game story. It is functional and useful, but the diegetic label better preserves a player’s sense of immersion in the experience.

The notion of diegesis is an interesting way to frame points-based vs. story-based games with a purpose. Points, ranks, and badges measure real things like player accuracy, time spent playing, or milestone accomplishments, but they only matter to players insofar as they quantify things the player values *outside the game*. A player who altruistically desires to help biologists taxonomically classify insect species would be interested in earning points based upon the quality of his or her classifications. The points are a valued measure of something external to the game: how helpful a player’s contributions are to a wider scientific discipline. When coupled with a leaderboard or community, the points grow in value, fostering competition, cooperation, and prestige. Yet they are non-diegetic; they do nothing to expand upon the world of the game.

Are all citizen science participants altruistic enough to value points, scores, and badges for the externalities they represent? Probably not. Most citizen science projects find that a core group of users provide most contributions, while a long tail of participants will contribute much less frequently (Franzoni & Sauermann, 2014). These “long tail” (Anderson, 2008) players seem unlikely to value scores or points that quantify their produc-

<sup>1</sup> <http://www.citizensort.org>

<sup>2</sup> <http://www.duolingo.com/>.

<sup>3</sup> <http://fold.it/>.

<sup>4</sup> <http://phylo.cs.mcgill.ca/>.

<sup>5</sup> <http://old.oldweather.org/>.

<sup>6</sup> <https://eyewire.org/signup>.

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