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Editorial: The Maturing of Gamification Research

Lennart E. Nacke
HCI Games Group, Department of Drama and Speech Communication, The Games Institute, University of Waterloo, Waterloo, ON, N2L 3G1, Canada. E-mail address: lennart.nacke@uwaterloo.ca

Sebastian Deterding
Digital Creativity Labs, University of York, Heslington, York YO10 5GE, United Kingdom. E-mail address: sebastian.deterding@york.ac.uk

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1. Introduction

Throughout history, many have championed the use of play, games, and game-inspired design to improve the human condition. In the mid-2000s, the confluence of web technologies, digital business models, and online and location-based gaming gave rise to the most recent manifestation of this basic idea. Mobile applications like foursquare and websites like StackOverflow borrowed design elements like point scores, badges, or leaderboards from social network games and meta-gaming systems like Xbox Live to motivate user activity. This industry practice quickly became known as gamification, which can be defined as the use of game design elements in non-game contexts (Deterding et al., 2011). Many startups and design agencies emerged to offer gamification design or software-as-a-service (SaaS) packages, and organisations across the globe began exploring gamification as a way to motivate people and improve the user experience. Applications reach from education and training to health, self-management, innovation, employee engagement, heritage, crowdsourcing, civic engagement, and marketing (Seaborn & Fels, 2015). Today, gamification is an established practice and industry segment, by some estimates poised to grow to over US$ 11 bn by 2020 (Markets and Markets, 2016).

A key enabler of this groundswell has been now-ubiquitous sensor and computing technology: smart cities, smartphones, and wearables are increasingly tracking and processing our every step, effectively turning our life-world into a digital game in waiting. In parallel, we see a shift to postmaterial values of self-expression and experience, catered to by a dematerialized ‘experience economy’ and a new profession and practice of experience designers, as well as the growth of digital games into a dominant cultural form, complete with a whole ‘gamer generation’ socialised into them. Economically, we can observe the transformation of business models and market differentiators towards innovation, user experience, customer relations, and the tight integration of customers into value chains with user-led innovation, crowdsourcing, and word-of-mouth-marketing, all of which make employee customer engagement a crucial capacity for organisations. Meanwhile, policy-makers around the globe awake to motivation, engagement, and user experience as vital levers for public policy goals in health, education, or civic engagement. Taken together, these technical, cultural,

economic, and political forces afforded and demanded a design practice that harnessed the potential of computing technology for improving user experience and engagement across domains and industries – and gamification filled this niche (Deterding, 2015).

As a research field, gamification has similarly risen to significance in the past six years and shows no sign of slowing growth. The first wave of gamification research has predominantly consisted of (1) definitions, frameworks and taxonomies for gamification and game design elements; (2) technical papers describing systems, designs, and architectures; and (3) effect and user studies of gamified systems (Hamari, Koivisto, & Sarsa, 2014; Seaborn & Fels, 2015). While work was initially published across venues in computer science, informatics, human-computer interaction, game studies, psychology, and many other disciplines, we are today seeing early signs of gamification research institutionalising as a cross-disciplinary field in the form of dedicated professorships,[1] educational programs,[2] collected volumes (Fuchs, Ruffino, & Schrape, 2014; Walz & Deterding, 2015; Reiners & Wood, 2015; Stieglitz et al., 2016), and academic conferences like *Gamification 2013*, where many authors submitted first versions of the present papers (Nacke, Harrigan, & Randall, 2013) and where the idea for this special issue was born.

2. Articles in this Special Issue

If the papers collected in this volume share one common trait compared to the first wave of gamification research, it is maturity. Each one in its own way marks a step forward in theoretical considerateness, methodological rigour, and differentiated conclusions. This maturity undoubtedly (hopefully!) owes to the extensive review and revision the articles have undergone since their submission, for which we thank our many reviewers and authors. However, as this volume holds even more papers submitted on an open call following *Gamification 2013*, it is also indicative of the field as a whole. If the first wave of gamification research was held together by fundamental questions of "what?" and "why?", the current wave is asking differentiated questions around "how?", "when?", and "how and when not?" More specifically, the papers collected here mark a maturation in three research domains: (1) theory-driven empirical studies, (2) design methods, and (3) application areas.

2.1 Theory-driven Empirical Studies

The first wave of empirical gamification research asked the blanket question, "does gamification work?", testing a wide diversity of gamified systems with an equally wide range of effect measures (Hamari, Koivisto, & Sarsa, 2014; Seaborn & Fels, 2015). While studies in this mode helped establish the face validity of gamification, their knowledge returns diminished quickly. For research to add up to a joint knowledge structure, it needs to flow into and from *theories.* These theories integrate and explain divergent empirical findings, identify relevant hypotheses to test next, and give practitioners a form of knowledge that helps understand and predict when and how which particular design will be effective or not (Whitley, Kite, & Adams, 2013, pp. 34–39; Deterding, 2014). And it needs to advance from testing gamified systems that combine (and thus conflate the effects of) multiple game design elements to study paradigms that tease out the effects, moderators and mediators of individual elements (Hamari, Koivisto, & Sarsa, 2014; Deterding, 2014). The majority of papers in this special

[1] https://web.archive.org/web/20161114121948/http://www.tut.fi/en/about-tut/news-and-events/tenure-track-in-gamification-x156741c1, accessed November 14, 2016.
[2] https://web.archive.org/web/20160903072123/https://www.coursera.org/learn/gamification, accessed November 14, 2016.

issue in various ways manifest this maturation from theory-less effect studies asking *whether* gamification works to theory-driven studies exploring *how* particular design elements work.

Thus, following up on an earlier study (Mekler et al., 2013), Mekler, Brühlmann, Tuch and Opwis (2015) used self-determination theory (SDT, Deci & Ryan, 2012) – arguably the most-frequently used psychological theory in gamification research to date (Seaborn & Fels, 2015) – to develop and test hypotheses about the trinity of gamification design elements: points, levels and leaderboards (Werbach & Hunter, 2012). SDT would suggest that points, badges and leaderboards, visualising progress made, serve as informational feedback instilling a sense of intrinsically motivating competence in the user. In *Towards understanding the effects of individual gamification elements on intrinsic motivation and performance*, Mekler and colleagues tested this hypothesis with an image annotation task. They found that compared to a non-gamified control condition, performance did increase significantly; however, they observed no significant differences in competence need satisfaction or intrinsic motivation emerged. In short, game design elements do increase performance, but not through intrinsic motivation, giving rise to the question what other psychological mediators account for their effect.

A possible answer to this question comes from Landers, Bauer and Callan (2016) in the shape of *Gamification of task performance with leaderboards: A goal setting experiment*. As their title indicates, they used goal-setting (Gollwitzer & Oettingen, 2012), another well-established theory of motivation, to generate and test predictions about the effect of leaderboards on performance in a brainstorming task. Findings suggest that leaderboards indeed may function as an implicit form of goal-setting, inviting users to self-set performance goals at or near the top of the leaderboard: people's performance on leaderboards populated with high scores that are difficult or impossible to achieve was comparable to that of people being given explicit difficult or impossible goals. In addition, the authors found that individual goal commitment, an established individual moderator in goal-setting theory, moderates performance with leaderboards as it does with explicit goals.

Another appeal to goal-setting theory comes from Hamari (2016). In *Do badges increase user activity? A field experiment on the effects of gamification*, he tested the effects of badges in a large-scale, two-year field experiment on an online peer-to-peer trading platform. Comparing pre- and post-implementation groups, Hamari found that awarding badges for them significantly increased the mean number of all core activities on the platform: making trade proposals, carrying out transactions, commenting, and viewing pages. While these findings are coherent with multiple theoretical mediators, not just goal-setting – as Hamari himself explicitly stresses –, the paper nevertheless demonstrates the uptake of goal-setting in the theoretical canon of gamification research.

Cruz, Hanus, and Fox (2016) nicely demonstrate that theory holds value not just for quantitative, hypothetico-deductive gamification research, but can also enrich and deepen the analysis of qualitative, exploratory studies. Their article, *The need to achieve: Players' perceptions and uses of extrinsic meta-game reward systems for video game consoles*, combined SDT and signaling theory (Donath, 2007) to guide a qualitative focus group study on meta-game or achievement systems on video game consoles like Xbox or PlayStation – arguably the blueprint for many of today's gamification platforms (Hamari & Eranti, 2011). Their findings highlight a key tenet of SDT, namely that the motivational effect of an environmental stimulus depends on the individual's *interpretation*, its meaning or "functional significance" (Deci & Ryan, 1985). Different players ascribed different meanings and functions to achievements and reported analogous different uses and experiences. Depending both on the design features of different platforms and games and players' need for

achievement, they could be experienced as intrinsically motivating competence boosts or more extrinsically motivated ego boosts and social status signals relating to how others perceive and appreciate one's own achievement.

Landers and Armstrong (2015) further showcase that different users may be more or less keen on adopting gamified systems depending on their attitude towards and prior experience with games – a key tenet of the Technology-Enhanced Training Effectiveness Model (Landers & Callan, 2012). In *Enhancing instructional outcomes with gamification: An empirical test of the Technology-Enhanced Training Effectiveness Model*, they tested the pre-training valence of regular PowerPoint versus gamified instructions, that is, how satisfying, enjoyable and relevant participants expected them to be before being exposed to them. Participants read scenarios describing each type of instruction. Overall, participants expected greater value from gamified instructions, but as predicted, this effect was moderated by attitude and experience: Participants with positive attitudes towards and high experience in games expected to benefit more from gamification, while participants with negative attitudes and little experience expected more benefits from traditional instruction.

2.2 Design Studies

Gamification design has been dominated by industry publications and frameworks, the majority of which have been neither validated nor grounded in game research or game design (Deterding, 2015a). Thus, several scholars called for systematic research into challenges, heuristics, tools, and methods around designing gamification (Deterding et al., 2013; Mora et al., 2015; Morschheuser et al., 2017).

One common critique of existing industry frameworks has been that they needlessly foreclose the gamut of inspiration games could provide to a small set of progress feedback interface patterns. *Designing interactive systems through a game lens: An ethnographic approach* by Rapp (2015) directly responds to this critique by conducting an ethnographic study of *World of Warcraft* to tease out key factors of its long-lasting appeal beyond those already established in the gamification literature. Based on factors like opportunities for social interaction and user representation as well as rewards, Rapp develops nine guidelines for the design of gamified systems. "Journey", for instance, recommends the implementation of varied types of rewards and persuasive strategies to support users during the different phases of behavior change and cater best to their current motivational stage.

Where Rapp focuses on design elements and factors, Malinverni, Mora-Guiard, Padillo, Valero, Hervàs and Pares (2016) take into view the design process itself. In *An inclusive design approach for developing video games for children with Autism Spectrum Disorder,* they present and evaluate an inclusive design method for developing game interventions that are both therapeutically effective and engaging and enjoyable for children with Autism Spectrum Disorder (ASD). Their method sets out with eliciting requirements from clinical experts to identify the scope and structure of the game, to then bring together game designers with children with ASD in participatory design workshops to learn what game elements most appeal to children, and then merge insights from both steps. A subsequent exploratory study suggests that the resultant, game, *Pico's Adventure*, was successful at instigating social interaction between children and their parents, as well as amongst children with ASD.

In a similar vein, Caro et al. (2016) describe a design case in *FroggyBobby: An exergame to support children with motor problems practicing motor coordination exercises during therapeutic interventions*. They used a long-term six-month pre-evaluation to understand patient needs before

proceeding to the gameful design phase, pursuing a participatory design approach to arrive at a game that is demonstrably engaging and helpful to children with motor coordination problems.

2.3 Deepening and Extension of Application Contexts

A vital aspect of gamification design is the context of application: many scholars have cautioned that not all activities and contexts lend themselves equally to being gamified, involuntary tasks and the proverbial funeral being prime examples (Kim, 2012; Webb, 2013; Mollick & Rothbard, 2014; Deterding, 2014a). In addition, early research very much focused on a few contexts like education (Kapp, 2012; Nah et al., 2014; Seaborn & Fels, 2015) and traditional human-computer interaction scenarios such as calibrations (Flatla et al., 2011). Extending the use of gamification beyond these contexts, and systematically studying the moderating effects of different individual and situational contexts is thus very much in need today. The studies presented in this section of our special issue extend our knowledge of where and why gamification may succeed or fail (e.g., gamifying drive logging).

Much literature claims that games are about learning at their core (Gee, 2005; Isbister et al., 2010), leading to the aforementioned focus of early gamification research on education. However, the assessment of effective learning strategies remains a hard problem in any field of research. This is due to a lack of long-term studies that systematically analyse the effect of gamified interventions on student learning. Barata et al. (2016) provide one of those systematic and effective long-term studies on gamified education in their paper *Studying student differentiation in gamified education: A long-term study*. This study provides excellent new information about behaviour and performance patterns of students that were using an online (and therefore tracked) student learning system with gamification elements that systematically varied over the years. The study goes in depth about student learner types and different personalised ways of engagement. The study ends with a rich array of design lessons that we can take as inspirations to our gameful design practices.

Another classic application scenario for gamification is making otherwise boring and repetitive tasks more engaging. In many countries, acquiring a driving license requires documenting a – tediously large – number of driving hours. In *Driven to drive? Investigating the effect of gamification on learner driver behavior, perceived motivation and user experience*, Fitz-Walter and colleagues (2016) compared a gamified driving logbook app to a non-gamified version to assess whether it motivated inexperienced drivers to practice more. Their four-week field study found that while gamification was found to be enjoyable, it did not change behaviour. This calls into question whether gamification is equally effective in different contexts.

3. Looking Ahead

Over the past six years, gamification has grown from a novel research topic into a thriving multi-disciplinary field. Where first studies often lacked in theoretical grounding, methodological rigour, and differentiation, the articles in this volume speak of a more mature mode of scholarship. Yet many challenges and open questions remain for gamification research going forward.

In terms of *understanding how gamification works*, we are now seeing studies isolating individual design elements, building on theories to derive and test hypotheses. This is an important first step. Still, the scope of elements being explored is limited (points, badges or levels, leaderboards), as is the canon of theories (SDT and increasingly, goal-setting) – fertile unexplored ground for future work.

Yet we are still dearly lacking studies with rigorous designs that assess both psychological mediators and behavioural outcomes – and do so long-term and in the wild, not just short-term and in the lab. Finally, many studies are still to some extent comparing apples with oranges, testing different implementations of design elements with different effect measures. Moving forward, a harmonising and standardising of interventions and measures would do much to enable true comparison and meta-analyses of effect studies. This would be the methodological precondition for the next step in instituting gamification research as a field: systematically developing germane new theories.

Moving on to *designing gamification*, we are seeing a welcome broadening from points/badges/leaderboards to other features and aspects of game design, and a merging of design concerns like participation or inclusion with motivation as the core concern of gamification. But again, there is a dearth of rigorous evaluation studies comparing different proposed methods, principles, tools both in terms of process quality (such as time efficiency or self-efficacy of designers) and outcome quality (such as quantity and effectiveness of produced designs). Maybe even more importantly, gamification design research faces the research/practice hurdle of much human-computer interaction research – most research outcomes are not adopted by practitioners because they are unknown or impractical (Rogers, 2004). Developing new formats of research outcomes and research-practice collaboration that improve the utility and adoption of gamification design research thus remains a desideratum.

Finally looking at *application contexts*, the articles in this special issue underline that one size does not fit all. Much has been made about the individual differences of 'player types' in existing literature (Deterding, 2015a; Tondello et al., 2016). But as Fitz-Walter and colleagues demonstrate, the very kind of activity might lend itself more or less to being gamified. Barata et al. show that there can also be important *context-specific* individual differences such as learning performance. And Caro and Malinverni with their colleagues expose how current gamification applications and methods are mostly limited to adults without disabilities, urging us to better understand and design for *all* audiences. We are just at the beginning of understanding what gamification design elements and methods best map onto what application domains (see e.g. Arnab et al., 2015, for education; Morschheuser, Hamari, & Koivisto, 2016, for crowdsourcing; or Johnson et al., 2016, for health and wellbeing). We know extremely little about the actual effect of 'player types', and the effectiveness of designing with player types in mind, let alone individual differences beyond them. And all of that says nothing yet about the relative impact of person versus situation on the effects of gamification, let alone potential interaction effects of the two. In a sense, current gamification research in its almost singular focus on player types seems blissfully unaware of 40 years of person-situation debate in psychology (Donellan, Lucas, & Fleeson, 2009). Future work in gamification research would do well to look at recent attempts of integrating these two factors (Fleeson & Noftle, 2008).

Gamification research promises no less than a science of how individual design elements, dimensions, and qualities affect user experience and engagement, with near-limitless applications. But to make good on that promise, we need validated theories how design elements function and interact with individual dispositions, situational circumstances, and the characteristics of particular target activities. We need validated formats that translate research findings into a shape useful for designers. And we need rigorous empirical studies informing both, theories and formats. However, at the heart of the gamification design process is the development of gameful systems, which are complex combinations and interactions between elements. To explain these systems, we will also need more complex explanations than the mere understanding of how each element functions individually. To explain these systems, we need to study the interaction of game design elements and the dynamics that

emerge during gameplay. In short, while gamification research is maturing, it is most certainly still in the early years of a long life.

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