

# Handbook of Research on Cross-Disciplinary Uses of Gamification in Organizations

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A volume in the Advances in Business Strategy  
and Competitive Advantage (ABSCA) Book Series

Published in the United States of America by  
IGI Global  
Business Science Reference (an imprint of IGI Global)  
701 E. Chocolate Avenue  
Hershey PA, USA 17033  
Tel: 717-533-8845  
Fax: 717-533-8661  
E-mail: [cust@igi-global.com](mailto:cust@igi-global.com)  
Web site: <http://www.igi-global.com>

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Library of Congress Cataloging-in-Publication Data

Names: Bernardes, Oscar, 1978- editor. | Amorim, Vanessa, 1992- editor. |  
Moreira, António Carrizo, editor.

Title: Handbook of research on cross-disciplinary uses of gamification in organizations / Oscar Bernardes, Vanessa Amorim, and Antonio Moreira, editor.

Description: Hershey, PA : Business Science Reference, [2022] | Includes bibliographical references and index. | Summary: "This book looks at the field of Gamification for economic and social development while providing for further research opportunities in this dynamic and growing field with the goal of increasing the understanding of the importance of Gamification in the context of organizations' improvements, providing relevant academic work, and empirical research findings"-- Provided by publisher.

Identifiers: LCCN 2021035415 (print) | LCCN 2021035416 (ebook) | ISBN 9781799892236 (hardcover) | ISBN 9781799892250 (ebook)

Subjects: LCSH: Gamification--Economic aspects. | Simulation games--Psychological aspects. | Simulation games in education. | Management games. | Organizational behavior.

Classification: LCC HB144 .H364 2022 (print) | LCC HB144 (ebook) | DDC 519.3--dc23

LC record available at <https://lcn.loc.gov/2021035415>

LC ebook record available at <https://lcn.loc.gov/2021035416>

This book is published in the IGI Global book series Advances in Business Strategy and Competitive Advantage (ABSCA) (ISSN: 2327-3429; eISSN: 2327-3437)

British Cataloguing in Publication Data

A Cataloguing in Publication record for this book is available from the British Library.

All work contributed to this book is new, previously-unpublished material. The views expressed in this book are those of the authors, but not necessarily of the publisher.

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Patricia Ordóñez de Pablos  
Universidad de Oviedo, Spain

ISSN:2327-3429  
EISSN:2327-3437

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Business Science Reference • © 2022 • 356pp • H/C (ISBN: 9781668423493) • US \$215.00



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Let's All Play Together: Motivations of Different Gamification User Types ..... 1

*Demos Parapanos, University of Cumbria, UK*

*Eleni (Elina) Michopoulou, University of Derby, UK*

Gamification is recognized as the next big thing in marketing by using game design elements in a non-game context. Producing desirable experiences and motivating users to remain engaged in an activity is one of the strengths of gamification. The introduction of digital social networks has become the biggest change regarding digital technology, also leading to the evolution and popularity of gamification. Although it is possible to design games, serious games, or gamified systems without knowing who the target users are, it is more likely to create a more engaging experience when these users are identified first. Taking this into consideration, this chapter will look to identify and present the motivations of individuals when using gamification systems. Identifying the motivations behind gamification usage and acknowledging the interaction between them will help organizations understand their audience and create more engaging experiences.

## **Chapter 2**

Should I Play or Should I Go? Identifying Challenges for Gamification ..... 24

*Daniel Cermak-Sassenrath, IT University of Copenhagen, Denmark*

A pervasive application of gamification in many areas of everyday life has arguably yet to happen. For instance, despite much commercial interest in and a potentially huge market for successful gamification products in the areas of education and health, much of the excitement is still based on speculation, and reception in parts of the academic community remains sceptical. The chapter aims to collate observations from multiple empirical studies and meta-studies and collect and highlight issues that need to be resolved or mitigated for gamification to progress. Such issues include unclear definitions, a limitation on small sets of elements employed with unclear effects, unintentional side-effects of competition, a confusing variety of operationalizations, the erosion of intrinsic motivation through extrinsic incentives, a disconnect between theoretical understandings and practical realizations, a strong focus on a behaviorist paradigm, studies' mixed, partial, and inconclusive results, a lack of attention to moderating factors, and methodological limitations.

### Chapter 3

Player/User Types for Gamification..... 62

*Necati Taşkın, Ordu University, Turkey*  
*Ebru Kılıç Çakmak, Gazi University, Turkey*

Gamification has created great expectations for education and has become a trend in education. It is not an easy process to integrate gamification into educational environments. The design and development phases of gamification are very important. Therefore, it is necessary to follow a model that will guide the process in gamification designs. Individual differences among students are an important factor affecting their learning performance. In this context, considering student characteristics will increase the effect of gamification in education. Personalized gamification designs that meet the needs and expectations of students will be more effective than one-size-fits-all designs. It can benefit from player/user types in gamification designs to identify individual differences. This chapter aims to discuss player/user types in relation to gamification in the context of education.

### Chapter 4

How to Gamify E-Government Services? A Taxonomy of Game Elements..... 86

*Ruth S. Contreras-Espinosa, University of Vic-Central University of Catalonia, Spain*  
*Jose Luis Eguia-Gomez, Polytechnic University of Catalonia, Spain*

Although gamification has been applied to the e-government domain for the past 20 years, the literature shows that the field still lacks formal definitions to support the design of gamified strategies on these types of platforms and services, and that game element selection is often a subjective matter. This chapter provides a useful taxonomy of game elements to support the design of e-government initiatives, elaborated from the analysis of the literature on gamification frameworks and models applied to this domain. This work was additionally validated by gamification experts from public and private organizations during a series of workshops. A total of 30 commonly used game elements were selected, conceptualized, and classified into six dimensions. Gamification experts agreed that this work contributes to standardizing the game elements employed in e-government services, while the authors also believe this taxonomy can be a useful tool to analyze already existing frameworks.

### Chapter 5

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The chapter examines the researchers' objective to see how gamification has been investigated in various science disciplines during the COVID-19 pandemic and its impact by grouping the findings into central concerns and core issues. The PRISMA approach is used to narrow down the list of relevant articles. The necessity for gamified interventions in the retail, education, and health domains is deliberated in this chapter. The findings suggest that academicians take the chance to collect empirical data and evaluate it in real-time to better understand the impact of gamification in a variety of professions.

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Gamification, a popular tool widely used in various contexts such as marketing, education, and organizations, among others, has demonstrated its potential for engaging, motivating, and achieving behavioral change in the targeted audience. For an ideal gamification system, it is necessary to know how the gamification elements affect human emotions. This chapter conducts a journey through gamified contexts and their psychological impacts on individuals. This chapter gathers up the different threads of gamification in the marketing context. The three important objectives fulfilled by this chapter would be that it provides information about the topic of gamification and the psychological perspectives behind its operation; discusses its application in various marketing contexts, such as digital marketing and online payment sites; and finally, investigates various behavioral outcomes of gamification.

## Chapter 7

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*Umit Basaran, Zonguldak Bulent Ecevit University, Turkey*

Advances in digital marketing technologies and the experience and value they provide to consumers have become important factors in market success. Therefore, businesses are focusing much more on the use of innovative technologies such as gamification. Gamification is the use of game design elements and mechanisms in non-game environments to increase the motivation of users to guide their behavior. Gamification elements used in marketing activities have an impact on the attitudes and behaviors of consumers towards brands, products, and services by increasing experience and value for them. Accordingly, this chapter is aimed at evaluating the gamified marketing activities from the perspective of customer value. In this context, the concepts of customer value and gamification are examined, and gamification techniques used in marketing and their effects on consumer value are evaluated. Also, the case study of Starbucks' gamified mobile application is presented from the perspective of customer value.

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Role-Playing Games as a Model of Gamification Applied to Engagement of Online Communities . 166

*Jose-M Jimenez-Pelaez, Nebrija University, Spain*

*Juana Rubio-Romero, Nebrija University, Spain*

Recent technological advances have promoted a social change that affects all areas of society, but mainly communication and entertainment, where social networks play a primordial function as they facilitate sociability and the creation of virtual communities. So-called "social media marketing" facilitates direct interaction between brands and markets through the Internet. For this, new communication strategies have been implemented, oriented towards the active participation of the users to increase their engagement. Some of these are inspired by the main product of the entertainment industry, videogames, through gamification. However, not many research studies have focused on classic role-playing games (RPGs), despite being considered the types of games that create the greatest player involvement. This work enquires about the possibilities offered by these games for the implementation of social media marketing strategies. A qualitative research study was conducted in which the engagement strategies utilized by RPG were associated with those utilized in social networks.

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Gamification and health are discussed from a one-sided perspective. Gamification and health studies focus on the use of gamification for health and overlook the perspective on how gamification affects health. This chapter discusses gamification and health in terms of organizations, individuals, and society, and addresses the effects of gamification on health and the use of gamification for health. Existing research on gamification and health addresses gamification practices developed for health and the health effects of gamification separately. Consequently, the aim of this chapter is to contribute to the original research collection organized into gamification studies in health from a holistic perspective.

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Natural User Interfaces for Meditative Health Games ..... 207  
*Ifeoluwapo Fashoro, Nelson Mandela University, South Africa*  
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The psychological health outcomes of video games are drawing increasing interest around the world. There is growing interest in video games as an accessible health intervention for depression and anxiety, both of which are rising health concerns globally. New interaction techniques for video games are becoming increasingly popular, with natural user interfaces (NUIs) becoming more commonplace in game systems. This chapter explores the design of a meditative game, a subgenre of casual games that intends for players to become calm and relaxed, and the evaluation of the NUIs for the game. The purpose of the chapter is to ascertain which NUI is most suitable for meditative games. A meditative fishpond game was designed that accepts two NUIs: touch and eye-tracking. The game was evaluated using a Positive and Negative Affect Schedule. The study found the eye-tracking interface reported a higher positive affect score from users and is therefore most suitable for meditative games.

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*Robert Herne, Murdoch University, Australia*  
*Mohd Fairuz Shiratuddin, Murdoch University, Australia*  
*Shri Rai, Murdoch University, Australia*  
*David Blacker, Perron Institute, Australia*

Stroke is a debilitating condition that impairs one’s ability to live independently while also greatly decreasing one’s quality of life. For these reasons, stroke rehabilitation is important. Engagement is a crucial part of rehabilitation, increasing a stroke survivor’s recovery rate and the positive outcomes of their rehabilitation. For this reason, virtual reality (VR) has been widely used to gamify stroke rehabilitation to support engagement. Given that VR and the serious games that form its basis may not necessarily be engaging in themselves, ensuring that their design is engaging is important. This chapter discusses 39 principles that may be useful for engaging stroke survivors with VR-based rehabilitation post-stroke. This chapter then discusses a subset of the game design principles that are likely to engage stroke survivors with VR designed for upper limb rehabilitation post-stroke.

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*Jaana-Maija Koivisto, Häme University of Applied Sciences, Finland*

*Elina Haavisto, Tampere University, Finland*

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A current concern in the medical field is that nurses leave their careers due to low work motivation. Intrinsic motivation is a key factor that influences satisfaction in the workplace. This study aimed to develop a gamification intervention for implementation in a hospital setting and evaluate its effects on nurses' work motivation. It was hypothesized that nurses' work motivation would improve by the end of the intervention. The study was conducted in a surgical ward at a hospital in Finland. The design was descriptive and quasi-experimental. The study found that continuous feedback from gamification interventions influenced nurses' work motivation. The gamified group offered more positive feedback than the non-gamified group. These findings add to our understanding of the effects of gamification interventions on nurses' work motivation in hospital settings. However, more research is needed to demonstrate the potential of gamification to increase the retention of much-needed human resources.

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*Jessica Reuter, GOVCOPP, University of Aveiro, Portugal*

*Marta Ferreira Dias, GOVCOPP, DEGEIT, University of Aveiro, Portugal*

*Maria José Sousa, Business Research Unit, Instituto Universitário de Lisboa, Portugal*

Organisations always seek to maximize the effectiveness of their internal systems. Gamification is a growing trend in work contexts, with employers realizing that many of the elements associated with it can be transferred to a business environment. Understanding the main concepts that make games appealing to society allows us to understand how they can be adapted and used in the professional environment, as well as in organizations. Therefore, besides gamification, game-based learning and serious games can be used in organizations for training and skills development. Understanding how gamification activities affect both extrinsic and intrinsic motivation is critical to understanding how they affect workers and how they can be used to their full potential. This study provides a critical analysis of the use of these tools to increase the motivation and collaboration of individuals in organizations. Playing in groups to learn is a practice that still needs more incentives and diffusion to be widely used in the company context.

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Applying Gamification Strategies to Create Training in Lean Methodologies: A Practical Case ..... 293

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*Henrique Bessa, Centre for Mechanical Technology and Automation (TEMA), Department of Mechanical Engineering, University of Aveiro, Portugal*

*Ricardo Ferreira de Mascarenhas, RM Consulting, Portugal*

It is more important than ever that organizations make the most of their resources, reduce costs, optimize processes, and engage in continuous improvement. A lean philosophy presents itself as a management model that guides companies in this direction, but for the successful implementation of lean



methodologies, human resources at all levels need to learn what it is and be engaged with it. Thus, there is a need to develop tools that would transmit the lean theoretical concepts in a practical and involved way. This chapter proposes the development of a tool that is the result of merging gamification and lean philosophy, developing a game for people without knowledge in this area, serving as an introduction to it, and demonstrating some applications of this philosophy. The practical result of the synergy created between strategies of gamification and training in lean methodologies is described.

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Gamification or How to Make a “Green” Behavior Become a Habit ..... 314  
*Lidia Aguiar-Castillo, Universidad de Las Palmas de Gran Canaria, Spain*  
*Rafael Perez-Jimenez, Universidad de Las Palmas de Gran Canaria, Spain*

One of the main challenges faced by tourist destinations is waste management. A poor waste collection and management policy is an additional factor affecting the tourist destination’s sustainability within this general problem. These situations are trying to be solved with incentives derived from gamification tools that motivate people to recycle. This study, within the scope of a European project called UrbanWaste, found significant results that suggested that this tool can promote recycling behavior, but what happens when customers come back home? Gamification even makes a habit take root in the people who use it by activating external motivators. This recycling habit emanates from an altruistic feeling and aims to leave a better world for future generations (intrinsic motivation). However, they also recommend the app to show a benevolent image by making the behavior visible (internalized extrinsic motivation) and improving destination branding.

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*Venera Tomaselli, University of Catania, Italy*  
*Giulio Giacomo Cantone, University of Catania, Italy*  
*Valeria Mazzeo, University of Catania, Italy*

This chapter provides a comprehensive overview of the phenomenon of review bomb, which occurs when an abnormally large amount of information is submitted to a rating system in a very short period of time by an overtly anonymous mass of accounts, with the overall goal of sabotaging the system’s proper functioning. Because review bombs are frequently outbursts of social distress from gaming communities, gamification theories have proven useful for understanding the behavioral traits and conflict dynamics associated with such a phenomenon. A prominent case is analysed quantitatively. The methodology is discussed and proposed as a generalized framework for descriptive quantification of review bombs. As a result of the study, considerations for technological improvements in the collection of rating data in systems are proposed too.

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*Eva Ordóñez-Olmedo, Universidad Internacional de La Rioja, Spain*  
*Sergio Albaladejo-Ortega, Universidad Católica de Murcia, Spain*  
*Marta Pérez-Escolar, Universidad Loyola Andalucía, Spain*

Hate speech is increasingly hindering the possibility of raising collective understanding as well as the values of democracy based on mutual respect, tolerance, and equality. For that reason, the main objective of this chapter is to determine how game-based learning favors the acquisition of transversal competences within the framework of 21st century skills for tackling and addressing hate speech. In doing so, a total of four serious games—Bury Me, My Love; Another Lost Phone: Laura’s Story; Never Alone; and Life is Strange: Episode 2 “Out of Time”—have been selected to analyze their potential as a learning tool for combating hate speech. To this end, the Octalysis framework serves as a methodology for identifying transversal competences in matters of justice, equity, and emotional intelligence. The main results show that serious games are helpful assets in promoting empathy and other social values and skills that are necessary to combat hate speech in young people.

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The Potential of Gamification for Humanitarian Organizations to Support Integration in Migration  
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*Marvin Jammernann, Carl von Ossietzky Universität Oldenburg, Germany*

*Beybin Elvin Tunc, Carl von Ossietzky Universität Oldenburg, Germany*

The aim of this chapter is to explore the connections between the inherent characteristics of gamification and the current need for sustainable integration activities that are based on meaningful social interactions. By highlighting the potential of gamification for creating democratic spaces of social interaction and engaging diverse actors in joyful encounters, it is possible to underline the notion of social change that gamification can induce. In the area of integration, humanitarian organizations can harness the potential of gamification in their integration activities in order to ensure increased social cohesion. Through a critical analysis of existing gamification and integration approaches, the chapter provides arguments for why gamification is perfectly suited to improve integration processes by highlighting the manifold applications of gamification experience in the humanitarian field.

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The Dehumanising Consequences of Gamification: Recognising Coercion and Exploitation in  
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*Sean Fitzpatrick, Griffith University, Australia*

*Timothy Marsh, Griffith University, Australia*

While gamification represents one of the largest technology trends of the last decade, only a limited selection of literature exists that explores the negative outcomes of contemporary gamified services, applications, and systems. This chapter explores the consequences of gamified systems and services, investigating contemporary implementations of gamification and acknowledging the ethical concerns raised by researchers towards contemporary gamified services. This chapter further explores these ethical concerns through a critical instance case study of China’s Social Credit System and arrives at informed observations on the potential for gamified cycles of reward and punishment to encourage unethical activity within organisations as well as legitimise ideological objectives that violate fundamental human rights. Recommendations are then made for researchers to explore this potential further, while recognising how gamification may justify the authority and practices of organisations, particularly those engaged in unethical and dehumanising behaviour.

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Gamifying Cultural Heritage. Education, Tourism Development, and Territory Promotion: Two Italian Examples..... 418

*Samanta Mariotti, University of Siena, Italy*

In recent years, communication and digital technologies have widely affected the cultural heritage sector, offering incredible opportunities to enhance the experiential value of heritage assets and improve cultural activities. Furthermore, another trend has gained significant attention: increasing users' engagement through gamification. Several studies have shown the efficacy of gamification for learning achievements, and gaming is also emerging as a useful tool for touristic objectives such as marketing, dynamic engagement with users, and audience development. This chapter aims at presenting two Italian game projects for mobile devices, created to enhance and promote the cultural offer of two peculiar territories. Game design choices, objectives, and outcomes will be discussed to highlight the benefits and limits of these tools and point out the changing practices of cultural institutions and local administrations, which are showing an increasing interest in the exploitation of video games, considering them as strategic marketing tools to promote cultural heritage and tourism.

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*Desislava Paneva-Marinova, Institute of Mathematics and Informatics, Bulgarian Academy of Sciences, Bulgaria*

*Maxim Goynov, Institute of Mathematics and Informatics, Bulgarian Academy of Sciences, Bulgaria*

*Detelin Luchev, Institute of Mathematics and Informatics, Bulgarian Academy of Sciences, Bulgaria*

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*György Szántó, Institute for Computer Science and Control, Hungary*

*Tibor Szkaliczki, Institute for Computer Science and Control, Hungary*

This chapter presents a novel learning approach for studying ancient Bulgarian history, civilization, and their cultural heritage, namely the Thracian civilization, through storytelling and serious game combinations. The chapter also provides an overview of serious educational games, digital storytelling, and game development tools that can be used to present ancient history and their cultural heritage. The combination of storytelling and serious games successfully helps instructors to motivate student learning, stimulate their curiosity, and make them interested. The authors developed a game editor and a game portal that facilitated the game's development by applying game templates, layout styles, and question pools.

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Is the Gamification of Scientific Work a Good Idea? "Little Lies Between Friends" at MT180® .... 467

*Stéphane Le Lay, Institut de Psychodynamique du Travail, France*

*Jean Frances, ENSTA-Bretagne, France*

This chapter shows that, contrary to what some researchers claim, setting up the conditions for a "playful environment" is not so simple, in particular when it comes to organizing a new competition for the

popularization of science (MT180®). In fact, we will see that popularization does not fit so easily into the “playful environment” desired by the organizers due to the gamified nature of the approach, which gradually colonizes the initial desire to present one’s scientific work and pushes some participants to exaggerate their results in order to go as far as possible in the competition. It is therefore feared that the gamification of scientific work, while compatible with neoliberal expectations, will in fact lead to the production of bad science. The question then arises as to whether the need to turn researchers into effective communicators with a view to building the “knowledge society” advocated by international institutions can be achieved through gamified approaches, with the risk of creating an ever-greater distance between (real) scientific knowledge and citizens.

### Chapter 23

Introducing Serious Games as a Master Course in Information Security Management Programs:  
Moving Towards Socio-Technical Incident Response Learning ..... 483  
*Grethe Østby, Norwegian University of Science and Technology, Norway*  
*Stewart James Kowalski, Research Institutes of Sweden, Sweden*

In this chapter, the authors outline their process for introducing serious games as a course in an Information Security Master Course Program at the Norwegian University of Science and Technology. The process is built on the author’s experiences from both participating, coaching, judging, and even arranging serious games and cyber security challenges. With the lack of cultural recipes (or shared experiences) in information and cyber security from previous generations, these recipes must be learned in other environments. Given the efficiency of using exercises for incident response training, the authors suggest that information and cyber security incident response can be learned efficiently through serious games as one type of exercise. The authors suggest that serious games give relevant learning experiences from both developing them and participating in them, and they suggest these learning experiences as part of the course, in addition to necessary instructions.

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Enablers and Barriers of Integrating Game-Based Learning in Professional Development  
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*Nashwa Ismail, Durham University, UK*  
*Anne Adams, The Open University, UK*

This study investigates the enablers and barriers of embedding technology for continuing professional development (CPD) of staff in the police sector. The research team developed an online game called “Child Witness Interview Simulation” (CWIS) to complement existing interview training for police officers and help them gain competency in interviewing children. Within the game design, development, and commercializing phases, the research team came across key themes that define the opportunities and challenges of implementing GBL through a police-based learning approach to CPD. The study identified that the successful implantation of Technology-Enhanced learning (TEL) in CPD falls into two broad categories: organizational, which considers learning outcomes, and individual, which considers learning aims and competency. Therefore, for successful implementation of TEL in CPD, ongoing supportive organizational culture that encourages employees and managers to be committed and motivated to implement TEL in CPD is necessary.

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### **Embracing Simulations and Problem-Based Learning to Effectively Pair Concepts of Aeronautics**

**With Flight Safety Training ..... 533**

*Ioanna K. Lekea, Hellenic Air Force Academy, Greece*

*Dimitrios G. Stamatelos, Hellenic Air Force Academy, Greece*

Cadets, in order to become pilots, apart from successfully passing their flight training program, need to also complete their academic education, where many technical subjects, such as aeronautics, exist. Cadets often face difficulties in comprehending certain concepts in the subject “aeronautics” as well as the applied link between aeronautics and flight safety. To this end, at the Hellenic Air Force Academy, an innovative educational tool is under development so as to facilitate students’ understanding of the practical use of aeronautics and its impact on aircraft safety. An important aspect of the proposed educational tool is that it can be easily adopted into the pilots’ flight training program and offer a complimentary training experience regarding mid-air crisis scenarios. The new educational tool is based on introducing in-class simulation and problem-based learning, thus combining theory and practice. The aim of this chapter is to describe the development of this educational tool and to demonstrate the way that it can be employed for academic and flight training purposes.

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## Preface

Topics in gamification have rapidly become a trend recently. The number of peer-reviewed scientific articles on games and gamification has increased dramatically during the last five years, indicating this trend. Games and gamification have become an interest in many domains, such as health, education, software engineering, psychology, social politics, and business.

There is a discussion about terms related to games and gamification. This book covers substantial literature on the impact of games and gamification on different scenarios. However, before discussing the literature, let us take a moment to review what a game is and what gamification is.

There are various definitions of “game,” and there is much discussion about the term. According to the Oxford Dictionary, a game can be considered an entertainment or pleasure activity. In general, “game” is related to “play.” Hence, a game is defined as “a form of competitive activity or sport played by rules.” Here, a game can have characteristic definitions, namely: (1) an activity undertaken for pleasure (to play), (2) led by rules, and (3) and the player tries to achieve a goal (to win).

Some of these criteria have been ignored with recent games, as there are some games with no clear end goal, such as the Sims or World of Warcraft (WoW). Goals in the game are necessary; otherwise, the player will have no targets. Therefore, it must be said that when an objective is not explicitly provided, the game must have goals for progress, which can also be very different per person as the goal is set by themselves. These self-made goals are designed to give players freedom of choice when setting them.

Games also have genres to determine the type of game; developers use them to understand gaming needs and consumers use them to help identify the game’s focus to fit their gaming preferences or current mood. Game genres define the interactive and narrative nature of games compared with literature and film, where their genres describe only their narrative. The complexity of the game genre stems from the interactive nature that other artforms lack. Adventure, role-playing (RPG), and even action are examples of extensive genres for the core gameplay mechanics, whereas first-person, third-person, will be the main point of view of the player in the game.

There are game genres that are not used in general, and they serve the purpose of helping to describe the game, but they may be too specific to be used as an identifier, which would be a rare sight. An example is how some websites or game distributors that list games may use genres like action games or turn-based role-playing but not “cooking” as one; this is then usually solved when there are enough cooking games for cooking to be placed under the “simulation game” genre. Unfortunately, this can confuse players looking for games when using many of these game genres.

One of the crucial factors in developing a game is the design. Game development has different areas for creating games, and game design is one of the many vital roles. Game design is the art of creating

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in-game experiences; they direct the game to the final product by making many choices ranging from mechanics, aesthetics, and dynamics, which are described in the Game Development Lifecycle (GDLC).

GDLC is the game industry's Software Development Lifecycle (SDLC). It was created to adapt to the needs of the multidisciplinary aspect of game development, as the regular SDLC sometimes proved inadequate. There are at least six steps in the GDLC process. It starts with prototyping, where the initial game concept is thought out, along with prototyping for the game mechanics. Next, the pre-production phase involved refining the initial game concept and writing game documents. After the pre-production phase comes the primary production. During this phase, the team will go through milestone checks every specified period. Just before the live release, there will be a beta phase where the team will run public tests for bug fixes and gameplay errors.

The gamification term was introduced in 2002 by Nick Pelling, a British-born videogame developer, as part of his startup, Conundra Ltd. Gamification seeks to apply the art and science of turning customers' everyday interactions into games that serve business goals. The field of gamification is still growing, so there are many opinions related to the gamification definition. According to the Oxford Dictionary, gamification can be defined as applying distinctive elements of gameplay (e.g., point scoring, competition with others, and rules of the game) to other areas of activity.

In recent years, gamification has gained worldwide popularity. Many activities are related to this topic; for example, Gamification Summits are held in the USA, Australia, and other countries. In addition, educational platforms offer courses related to gamification from several well-known universities worldwide.

Gamification is about (1) utilizing elements of a game (not the entire game), meaning it does not necessarily include game techniques, but more about how the game will be played and the idea behind it; (2) the implementation in a non-game environment; and (3) increasing target behavior and engagement. Therefore, most of the benefits of gamification are not limited to a commercial environment. It can also be used for internal purposes, such as improving behavior. Many companies have considered the influence of games in changing people's behavior. For example, LinkedIn, Amazon, and Foursquare are some companies that have included a gaming element in their websites and services.

In addition, gamification is growing in popularity with regard to website optimization. Website optimization is about how to utilize a website to have a better influence on the website visitor's behavior, and gamification is an excellent solution in this matter. After identifying which targeted visitor behavior to encourage, several techniques are applied to achieve this target. Here, gamification can be implemented to stimulate the targeted behaviors. A well-designed game provides a feeling of joy and happiness to the players. They create an environment to ensure the players are involved and want to continue the experience and feelings.

Every time a player wins and receives a reward, the brain produces dopamine. This dopamine creates feelings of joy, fun, and well-being. The dopamine created will be more significant when the levels of challenge, achievement, and satisfaction are greater; hence, the player will feel satisfied. Therefore, it can be said that games create happiness, fun, and enjoyment by offering challenges that can be overcome until they finally produce dopamine.

Because games have been proven to teach knowledge or skills that will be useful in life, gamification using game elements can also increase engagement and target behavior in other areas as well, for example, in promotions, employee productivity, behavior change, loyalty, and education.

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This book covers many topics related to games and gamification that fit into today's world. Therefore, this book is suitable for anyone interested in learning more about gamification, games, and their application in various fields.

The book comprises 25 chapters, where every chapter explains different implementations of gamification from a cross-discipline view. It covers all the necessary information about gamification, starting from player/user types for gamification, motivations of different gamification user types, identifying challenges, and gamification application areas. An interesting point of view where gamification could be more beneficial during the COVID-19 pandemic is also written in this book. Several applications of gamification in e-government are also mentioned. In the marketing domain, evaluations of gamification from both the customer value perspective and the psychological view are described. It also covers the implementation of gamification case studies such as in politics, in developing eco-friendly behavior, in the course of information security management programs, in child witness interview simulations in the police sector, and in-flight safety training.

The first chapter, "Let's All Play Together: Motivations of Different Gamification User Types," will attempt to ascertain and present the motivations of people who engage in gamification activities. Recognizing the motives for gamification's use and their interaction will assist companies in better understanding their audience and creating more engaging experiences.

Despite considerable commercial interest and a potentially enormous market for effective gamification products in education and health, much of this knowledge remains speculative. In this context, Chapter 2, "Should I Play or Should I Go? Identifying Challenges for Gamification," purports to examine ambiguous definitions related to a reliance on tiny sets of elements with unknown effects, unintended consequences of competition, a bewildering range of operationalizations, and the loss of intrinsic motivation via extrinsic incentives, among other issues.

The next chapter, "Player/User Types for Gamification," seeks to analyze the individual disparities among students that influence their academic success. Taking student traits into account will amplify the impact of gamification in this scenario. Thus, this chapter aims to discuss player/user types concerning gamification in education.

"How to Gamify E-Government Services? A Taxonomy of Game Elements" presents a useful taxonomy of game features that can be used to aid in the design of e-government projects. It was developed by examining the literature on gamification frameworks and models used in this domain.

The chapter "A View on the Impact of Gamified Services in the Wake of the COVID-19 Pandemic: An Interdisciplinary Approach" covers the researchers' purpose of examining how gamification has been researched in many science fields during the COVID-19 pandemic and its influence using the PRISMA approach to categorize the findings into primary problems and core issues.

It is vital to understand how gamification aspects affect human emotions in order to design an optimal gamification system. "Application of Gamification in Marketing Context: Psychological Perspectives," Chapter 6, takes the reader on a tour of gamified environments and the psychological effects they have on humans. This chapter summarizes the various strands of gamification in the context of marketing.

The following chapter, "Gamification in Marketing: A Case Study From a Customer Value Perspective," examines the relationship between customer value and gamification, as well as the gamification strategies employed in marketing and their effect on consumer value. Additionally, a case study of Starbucks' gamified mobile application is provided from the customer value standpoint.

"Role-Playing Games as a Model of Gamification Applied to Engagement of Online Communities" is the title of Chapter 8, which seeks to implement the opportunities that these games present for



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implementing social media marketing techniques. A qualitative research study was done to determine the correlation between role-playing games' engagement tactics and those used in social networks.

Chapter 9, "Gamification and Health in a Holistic Perspective," explores the relationship between gamification and health in terms of organizations, individuals, and society, as well as the consequences of gamification on health and the usage of gamification for health.

The effects of video games on mental health are gaining worldwide attention, and natural user interfaces (NUIs) are becoming more common in-game systems. In this context, the chapter "Natural User Interfaces for Meditative Health Games" explores the design of a meditative game, a subgenre of casual games that intends for players to become calm and relaxed, and the evaluation of the NUIs for the game.

"Serious Games Design Principles Using Virtual Reality to Gamify Upper Limb Stroke Rehabilitation: The Importance of Engagement for Rehabilitation," Chapter 11, emphasizes that a stroke limits one's ability to live independently while also lowering one's quality of life. This chapter then discusses a subset of the game design principles that are likely to engage stroke survivors when they use virtual reality for upper limb rehabilitation following a stroke.

Intrinsic motivation is a critical factor in determining job satisfaction. Chapter 12, "The Effects of Gamification on Nurses' Work Motivation," pretends to develop a gamification intervention for implementation in a hospital setting and evaluate its effects on nurses' work motivation.

The next chapter, "Collaborative Learning: Increasing Work Motivation Through Game-Based Learning," demonstrates how organizations can benefit from game-based learning and serious games for training and skill development, providing a critical analysis of the use of these tools to increase motivation and collaboration among individuals in organizations.

It is critical for organizations to maximize their resources, reduce costs, optimize processes, and engage in continuous improvement now more than ever. Chapter 14, "Applying Gamification Strategies to Create Training in Lean Methodologies: A Practical Case," seeks to propose the development of a tool that is the result of fusing gamification and lean philosophy by creating a game for those unfamiliar with the subject, serving as an introduction to it, and demonstrating some of the philosophy's applications.

Chapter 15, "Gamification or How to Make a 'Green' Behavior Become a Habit," establishes that waste management is a significant issue for tourist destinations. This study, conducted as part of a European project called UrbanWaste, discovered significant results indicating that this tool can help increase recycling behavior. However, what happens when customers return home?

"Review Bomb: On the Gamification of the Ideological Conflict," Chapter 16, provides an in-depth examination of the Review Bomb phenomenon, which occurs when an abnormally large amount of information is submitted to a rating system in a short period of time by an overtly anonymous mass of accounts with the intent of undermining the system's proper functioning.

Hate speech is eroding the possibility of collective understanding and undermining the democratic values of mutual respect, tolerance, and equality. In this context, the chapter "Game-Based Learning for the Acquisition of Transversal Skills: Preventing and Addressing Hate Speech" has as its objective to determine how game-based learning favors the acquisition of transversal competencies within the framework of 21st-century skills for tackling and addressing hate speech.

Chapter 18, "The Potential of Gamification for Humanitarian Organizations to Support Integration in Migration Contexts," explores the connections between gamification's inherent characteristics and the current demand for sustainable integration activities built on meaningful social interactions. The chapter demonstrates why gamification is ideally suited to improving integration processes through a critical analysis of existing gamification and integration approaches.

## **Preface**

The chapter “The Dehumanising Consequences of Gamification: Recognising Coercion and Exploitation in Gamified Systems” considers the implications of gamified systems and services, examining current gamification implementations and addressing ethical concerns raised by researchers about current gamified services. This chapter examines these ethical concerns in greater detail through a critical case study of China’s Social Credit System.

Communication and digital technologies have had a significant impact on the cultural heritage sector in recent years, providing excellent opportunities to increase the experiential value of legacy assets and cultural events. In this perspective, the chapter “Gamifying Cultural Heritage. Education, Tourism Development, and Territories Promotion: Two Italian Examples” aims to present two Italian mobile game projects designed to enhance and promote the cultural offerings of two distinct territories.

“Studying Thracian Civilization Through Serious Games and Storytelling” presents an innovative method for understanding ancient Bulgarian history, culture, and cultural heritage, specifically the Thracian civilization, through the use of storytelling and serious games. Additionally, the chapter discusses serious educational games, digital storytelling, and game production tools.

Chapter 22, “Is the Gamification of Scientific Work a Good Idea? ‘Little Lies Between Friends’ at MT180®,” shows that, contrary to what some researchers claim, setting up the conditions for a “playful environment” is not so simple, in particular when it comes to organizing a new competition for the popularization of science.

“Introducing Serious Games as a Master Course in Information Security Management Programs: Moving Towards Socio-Technical Incident Response Learning” pretends to outline the process of introducing serious games as a course in an Information Security Master Course Program at the Norwegian University of Science and Technology. The process is built on the author’s experiences from participating, coaching, judging, and even arranging serious games and cyber security challenges.

The enablers and barriers of embedding technology for Continuing Professional Development (CPD) of staff in the police sector are explored in the chapter “Enablers and Barriers of Integrating Games-Based Learning in Professional Development Programmes: Case Study of Child Witness Interview Simulation in the Police Sector.” The research team developed an online game called “Child Witness Interview Simulation” (CWIS) to complement existing interview training for police officers and help them gain competency in interviewing children.

The last chapter, “Embracing Simulations and Problem-Based Learning to Effectively Pair Concepts of Aeronautics With Flight Safety Training,” emphasizes that cadets often face difficulties in comprehending certain concepts of the subject “aeronautics” as well as the applied link between aeronautics and flight safety. In this perspective, the chapter seeks to describe the development of this educational tool and to demonstrate the way that it can be employed for academic and flight training purposes.

We hope that this book provides an enjoyable reading experience for readers.

# Chapter 16

## Review Bomb: On the Gamification of the Ideological Conflict

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### ABSTRACT

*This chapter provides a comprehensive overview of the phenomenon of review bomb, which occurs when an abnormally large amount of information is submitted to a rating system in a very short period of time by an overtly anonymous mass of accounts, with the overall goal of sabotaging the system's proper functioning. Because review bombs are frequently outbursts of social distress from gaming communities, gamification theories have proven useful for understanding the behavioral traits and conflict dynamics associated with such a phenomenon. A prominent case is analysed quantitatively. The methodology is discussed and proposed as a generalized framework for descriptive quantification of review bombs. As a result of the study, considerations for technological improvements in the collection of rating data in systems are proposed too.*

### INTRODUCTION

The Last of Us Part II (TLOU2) is the sequel of The Last of Us (TLOU), a video game originally published by Sony in 2013. Both TLOU and TLOU2 are works of fiction classified as only-for-adults because of the presence of violence and horror scenes. They have been commercial successes for Sony. The main character of TLOU is Joel, who protects his adoptive daughter Ellie. In TLOU2, the new character Abigail,

DOI: 10.4018/978-1-7998-9223-6.ch016

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whose father was killed by Joel himself in TLOU, kills Joel. Ellie and Abigail are both main characters of TLOU2, and they share a fierce rivalry fuelled by a common sentiment of vengeance. Through the marketing campaign started in 2018, Sony revealed that:

- Joel would have not been the protagonist and he would have been killed in TLOU2.
- Ellie would experience a homosexual relationship with a person of Jewish ethnicity.

It became also of public knowledge that Sony was working into producing a TV series adaptation of the video game. This news was received with contempt from some communities of video game players. Major topics of criticism regarded LGBTQ and feminism-related issues. The presence of these elements in the narrative was perceived by someone as an attack against the cultural identity of the typical player of violent horror video games. This was also strongly linked with the Internet hashtag #GamerGate, an anger campaign against the mainstream artistic direction of video games (Ferguson and Glasgow 2020). #GamerGate is associated with social media activity and Internet communities (e.g., *4Chan*) where there is a presence of American far-right supporters and other political extremists.

After being postponed for reasons related to Covid-19 pandemic, TLOU2 was released for worldwide retail on June 19th, 2020. Even if the median time to have a full experience of the video game can be estimated between 15 and 30 hours, after few hours from the publication date, the website *metacritic.com* (*Metacritic*) received a peak of thousands of negative ratings and sour reviews.

On Metacritic, a user with a registered account can secretly submit a score (from 0 to 10), or a whole public rating (score plus text, also generating more metadata), of an item. This mechanism is part of a rating system, or a system devoted to collection of data in the form of ratings. When a user submits a rating, this is publicly displayed on the webpage of the item and on the webpage of the user's account. In the first days of ratings, the users' rating metric of TLOU2 on Metacritic fell into a value slightly above 3/10, making *The Last of Us Part II* the worst first-day performer video game in Metacritic's history.

This was immediately seen as a case of Review Bomb (RB). RB is a jargon expression, mostly adopted in journalism (PC Gamer, 2020), to refer to a phenomenon where a crowd of people performs an explicit, perceptible, sabotage of a website, showing public ratings or reviews. The result of the low rating metric on Metacritic was achieved through the socio-political mobilization of a mass of accounts that rated the video game with strategically low scores (0 or 1).

Expert reviewers question the legitimacy of such extreme ratings. Indeed, the expert assessment of TLOU2 on Metacritic (METAScore, which is also the primary business of the website) was extremely high (97/100). Ratings from buyers on Amazon were ranging around extremely high scores, too. Differently from Amazon, Metacritic does not verify who purchased the item (Anderson and Simester, 2014).

After noticing the case for an RB, Metacritic changed its internal rules to avoid rating submissions by 48h after the publication date of an item (Yahoo!Finance, 2020). It is possible that while in the first days extremely low ratings were submitted mostly as a subtle attack against the video game and the website Metacritic, this attack had the effect to influence the ratings of other users in the days after.

This is surely true in a case: the occurrence of the bomb of negative scores against TLOU2 made more radical the judgement of other users. These become ideological defenders of the item in the following days. Users who would have rated the item with a generic positive score (e.g., 8/10) felt the ideological push to rate it as a 10, the maximum score to balance the rating metric and bring 'justice'. This push for positive reviews is, for the original review bombers, a 'boomerang effect' that needs to be balanced

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with injection to even more negative reviews until one of two parties desists. This is in accord with the formal theory of escalation of conflicts (Saperstein, 2004).

But this notion of influence likely goes in the other direction, too: it could be possible that a user, who would have regarded TLOU2 as a mediocre product, felt propelled to rate it as extremely bad, instead. This is true especially if the second user (the follower) regards the first one (the original bomber) as a friend or if he or she self-identifies with the general message of the RB, producing an effect of crowd mentality, or *herding* (Lee et al., 2015; Wang et al., 2018).

Escalation of conflict *plus* herding set for a valid theory of polarised conflict that self-propagates. If these concepts could be made operative with method, such hypotheses can be discussed with the public data of the public ratings (score and text) as empirical basis.

## Objectives of the Research

The ideal objective of a scientific research on public opinion dynamics (conflict *vs.* herding) would be to observe and quantify effects at individual level. For example, to infer what is the (complex) effect of the mediatic exposition to a Review Bomb in terms of behaviour for a user of a website like Metacritic. Unfortunately, lacking any experimental data on the exact opinion on the item before the exposition to RB of those users who gave extreme scores, this task seems not approachable, at least directly.

A key point is that the video game was bombed since the publication date, which means that the opinion on it was pre-formed already through advertising trailers. A net impact evaluation that quantifies how much RB distorted the rating metric, if possible, would be misleading.

It is worth to consider the flux of reviews to Metacritic as a population of statistical events, instead. These events are characterised by some features that can be employed to stratify the population into groups. The prevalence across the time of these groups describes in detail the dynamics internal to this statistical population, mapping the conflict between users who attacked the item, users who defended it and neutral reviewers. For these reasons, the objective of the research is to perform an analysis on the dynamics of these groups in conflict rather than to infer effects at individual level.

## Core Features

- Since scores were submitted with a strategic intent (to push the rating metric), scores are the stronger identifiers of the conflict among groups.
- Users who wanted to influence others had to write a review. Reviews may differ hugely from each other, and techniques of text mining can be employed to cluster reviews according to their content. There are three concepts that can be detected in a review:
  - if a review brings a judgement over elements within the product (e.g., a technical benchmarking if the graphics are at the state-of-the-art), which is the normal function of a review;
  - if the text of a review is ideologically charged;
  - finally, one of the typical contents of a ‘bombing’ review is a reference to a situation that is external to the item under judgement. All ideological reviews are judging something that is external to the technical merits of TLOU2 and that reflects, for example, the normative values of the reviewer. However, there could be reviews that reflect a judgement over the behaviour of other users without an explicit ideological criticism. For example, user  $u_2$  could say: “people like user  $u_1$  are rude”, without explicating an ideological position about those.

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This is a reflexive act of communication. This communication is, again, not about the virtual experience of the video game itself, which should be the focus of a user's review, instead.

This concept is referred to as Metatalk (Tomaselli et al., 2021).

- Users have a history on Metacritic. Some of them have rated a lot of items, others only a few. But the most important distinction should be between users that reviewed only TLOU2 and users that reviewed other items on Metacritic (Tomaselli et al., 2021).

A combination of scores, textual clusters, and number of past reviews can stratify the population of users that rated TLOU2 on Metacritic to catch and describe its internal dynamics.

## **BACKGROUND**

In order to help online users and customers in filtering items, recommender systems are being used to try to get predictions accordingly to users' preferences. Specifically, a recommender system (RS) is a system of tasks aimed to nudge a user (a generic person that interacts with it) to take one or more decision, or to call the user for some actions. In recommender systems, the nudges are determined with data collected through a rating system.

With the aim to 'recommend the best', a RS suggests what to do to their users sorting and filtering (Jannach et al., 2010) the options in a catalogue of the system ('items'). These functions of sorting and filtering are evidence-based, which means that a RS needs evaluative data (i.e., the 'ratings') about the items in the catalogue in an explicit (e.g., explicit votes or declarations) or implicit (e.g., counts of observed actions or facts) format.

The most common format to collect explicit ratings is user's score, i.e., a numerical value in multi-point scale. The score quantifies both the user's opinion and sentiment on an item. Sometimes, a textual declaration ('review' or 'comment') is also provided with the score, as explicit data.

Rating aggregators (RAs) are online platforms that, functioning as rating systems, collect ratings to provide a RS-like service to the public. Differently from the personalised variant of RS, RAs are less invasive of privacy. Personalised RS perform a normative function towards individuals, RAs hold this function for a generic public.

While personalised RS are focused on filtering items tailored for what the rating system knows about the user, RAs focus on the construction of ratings metrics. These metrics are sometimes presented as statistics descriptive of a population, but the correct way to interpret such statistics is like estimations of a latent central value of the quality of item (Tomaselli and Cantone, 2020). However, since items in the same category can be ranked according to these estimates, they have an important function of filtering items: best values determine 'tops of the charts' and most of users will only look at items topping their charts of interest.

### **Statistical Distributions of Scores and Fake Reviews**

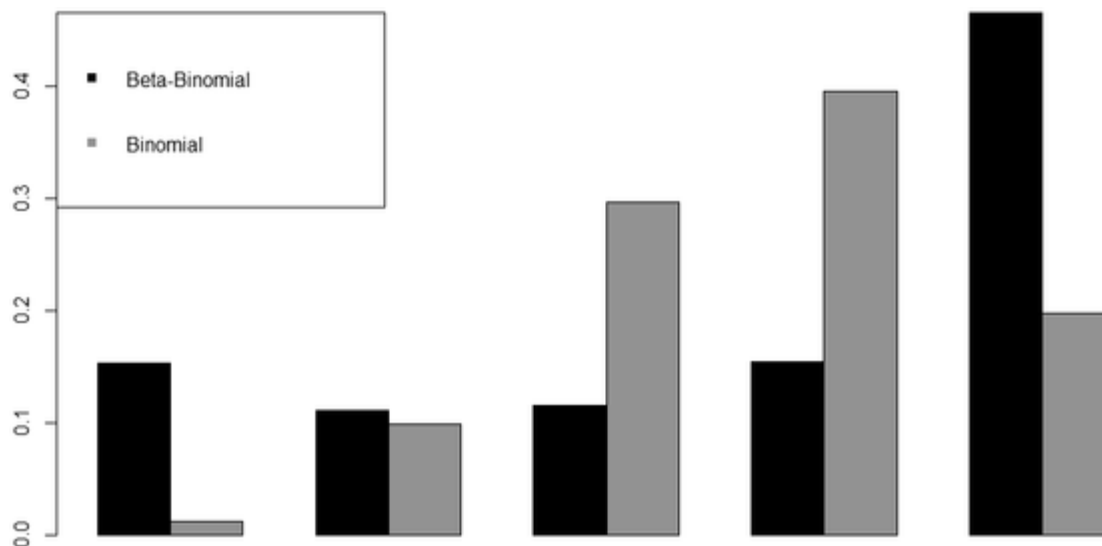
While scores collected in experimental settings (i.e., Randomized Clinical Trials) respect methodological assumptions or normality (i.e., independence of observations), scores collected in online (open) platforms are subject to two biases:

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- Purchasing bias: people review what they purchase but they purchase what is already reviewed or at least already popular (a case of “Matthew Effect”);
- Under-reporting bias: people review when they are extremely satisfied or unsatisfied.

The consequence of these biases is a *J*-shaped distribution of scores in online ratings (Hu et al., 2009; Schoenmuller et al., 2020; Smirnova et al., 2020). *J*-shaped distributions fit Beta-binomial models when  $\alpha$  and  $\beta$  parameters are both  $< 1$  (Figure 1).

Figure 1. The Probability Mass Functions of a Beta-Binomial distribution with  $\alpha = .6$  and  $\beta = .3$ , compared to a corresponding Binomial distribution with  $p = \alpha / (\alpha + \beta) = .66$ . The two distributions have the same mean, but the mass of the Beta-Binomial is shifted towards the extremes, not the centre.



These biases make easier to fraud the RS. Fake reviews with extreme scores can be injected:

- through the so-called ‘sock puppet’ accounts, when there is only one physical person that secretly operates through different accounts and identities. If these identities are managed by an automated system, sometimes it can be referred as a *botnet* of fake accounts;
- or by ‘shills’, that are people persuaded or bribed to report insincere or misleading reviews.

Experimental results confirm that positive fake reviews have an impact on the success of online business: according to van de Rijt et al. (2014), fake success breeds real success. This is predicted by the basic formulation of Thomas’s Theorem of the self-fulfilling prophecy: situations defined as real in their premises (a fake considered genuine), became real in their consequences (induce a cognition of quality). A consensus on the impact of negative fake reviews has not been reached, yet.

An RS having the information that the reviewer purchased the item (e.g., Amazon has this knowledge) can weight the relevance and the authenticity of a rating through this information (Anderson and Simester, 2014).

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However, usually RAs do not know how much the user is experienced about the item (e.g., how much time spent interacting with the item). Shilling is an easy job on a RA: one could ask an uninterested friend with an account in the system to rig a review (Ong et al., 2014).

To overcome such ambiguities, researchers have adopted the broader perspective of ‘attacks of spam reviews’ (Hussain et al., 2019). Spam is not necessarily fake but it is an excess of information, which is undesired or harmful for the purposes of the system. The operative shift from the categories of ‘fake reviews’ or ‘shilling intents’ to the broader ‘review spam’ is both methodological and conceptual. The questions around illegitimacy of the content are not searched in the subjective disposition of the reviewer (e.g., “are they good guys, well informed, who want to provide useful data to our system ... or bad guys who want to corrupt our metrics?”) but in objective features (e.g., “are these data harmful for our system?”).

## Review Bomb: Spam Attack or Cyber-Mob?

Aggarwal (2016) devotes entire Chapter 12 (pp. 385-408) on the topic of spam attacks. To make a spam attack harder to detect, fake ratings must be deployed slowly in the time. The goal is to mimicry the behaviour of a regular user. The consequence of this precautionary mechanism is that systems that collect a lot of ratings are general robust against mainstream spam attacks. Indeed, one of the first public statements on RB came in September 2017 from Steam, a digital online market and social network for video game players, and it says:

*“Review bombing is where players post a large number of reviews in a very compressed time frame, aimed at lowering the Review Score of a game. [...] Players doing the bombing are fulfilling the goal of User Reviews - they’re voicing their opinion [...]. But one thing we’ve noticed is that the issue players are concerned about can often be outside the game itself. It might be that they’re unhappy with something the developer has said online, or about choices the developer has made in the Steam version of their game relative to other platforms, or simply that they don’t like the developer’s political convictions. Many of these out-of-game issues aren’t very relevant when it comes to the value of the game itself, but some of them are real reasons why a player may be unhappy with their purchase. [...] we believe the issue behind the review bomb genuinely did affect the happiness of future purchasers of the game, and ended up being accurately reflected in the regular ongoing reviews submitted by new purchasers. In some review bomb cases, the developers made changes in response to the community dissatisfaction, and in others they didn’t - but there didn’t seem to be much correlation between whether they did and what happened to their Review Score afterwards” (Steam, 2017).*

In the words of Steam, RB is seen just as an anomaly: “there didn’t seem to be much correlation between whether they did and what happened to their Review Score afterwards”. The system cannot precisely assert the correct rating of an item. At the same time, Steam is well guarded against fake reviews because by its own mixed nature of both marketplace and performance-enhancer, Steam has a lot of information about its user base. In particular, Steam knows the exact amount of time the user interacted with the reviewed item.

The case of RB of TLOU2 on Metacritic is an exception in regard of all the mentioned ‘roles’ of spam attacks. The bombing was organised as attack before the actual publishing of the video game. It is also unclear how many accounts are sock puppets (same user, different accounts) and how many are the more ambiguous category of shills (liars).



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However, accounts involved in RB usually lack a history of previous reviews or ratings in the system (because they are spammers or because they just people herding into it). This is an important point, because it links the theory of RB as a spam attack to a more general issue in RS, the problem of cold-start.

### Review Bomb as a Problem of Cold-Start

The phenomenon of Review Bomb can be seen as a particular case of spam attack where users publish, in a short time span, fake or misleading reviews on specific products, brands or services, with the aim of discrediting or promoting these.

Recommendations are reliable by profiling the accounts through their past statistics (preferences, ratings, reviews) and demographic information (e.g., location, age, gender). In the case of review spamming, generally it can be observed that spammers are new accounts, i.e., accounts lacking past interactions with the system. Any new account is, therefore, hard to identify correctly as malicious.

This scenario is known as a “cold start problem” and refers to the case where new user data is limited, or historical information is not available. (Revathy and Anitha, 2018).

A possible way to address this issue is through the construction of effective behavioural features from pre-existing data, looking for similarities: this involves checking out complex characteristics as linguistic style. Generally, linguistic features can be employed in spam review detection, but these might result ineffective as review spammers easily can change their writing style (Wang et al., 2017; Tang et al., 2020).

There is another issue: detection algorithms are geared towards a conservative approach. In facts, RS cannot exceed in flagging reviews as spam in absence of robust evidence, because this will make it a hostile environment for new users with strong or divergent opinions, but definitely genuine and not malicious ones.

All these elements make RAs perfect targets for review bombers: RAs are not very optimized at tracking information about their own accounts. A high percentage of reviews is published by users who try the service once and, unbound by any payment for access or perceived benefit, will never review anymore. In this context, it is easy for a sock-puppet or a shill to disguise as someone who just tried to make a review. During an RB, illegitimate account can disguise for people genuinely engaged in the controversy.

Sock-puppets are more common in reviewing experience goods, i.e., goods which value is only loosely tied to their technical characteristics, like food or books) because these goods are the most influenced by word-of-mouth.

A difference between review spam and sock-puppetry is represented by the fact that sock-puppets usually dilute the trend of their malicious and non-legitimate reviews through time, making difficult to spot the fake accounts.

### Review Bomb as a Gamified Conflict

From a gamified perspective, users in social platforms can be seen as real/virtual players that can compete, cooperate or engage in conflict (Sailer et al., 2017). Social Media, for instance, enable e-participation (Khan and Krishnan, 2017), motivating user participation and content consumption (Laeq Khan, 2017).

Looking at the phenomenon from another perspective, the organisation of the bombing could pursue the symbolic goal to trigger a broader discussion about issues as the integrity of the reputational systems (i.e., journalism, RAs like Metacritic, etc.), or other (somehow) ideologically driven issues. Quoting Steam (2017), again: “they’re voicing their opinion [...]. But one thing we have noticed is that the issue

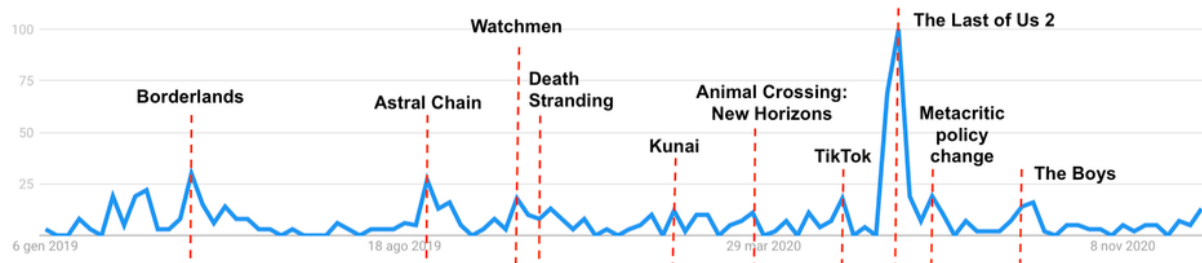
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players are concerned about can often be outside the game itself. It might be that they're unhappy with something the developer has said online, or about choices the developer has made in the Steam version of their game relative to other platforms, or simply that they do not like the developer's political convictions". Those "issues outside the game itself" (Steam, 2017) constitute the Metatalk of the review (Tomaselli et al., 2021). It is evident that political discussions are frequent in cases of RB.

Social platforms, including Metacritic, have gamification elements embedded into their systems; for example, the number of likes/dislikes is a gamification element. This aspect can be extended also to items, where the number of scores assigned to it represents another gamification element, making gamification easily to be applied to marketing and sales on a business level (Patrício et al., 2018). The link between RB and gamification is that RB is becoming a typical strategy of conflict among self-identified gamers or 'fanatics of video games'. Figure 2 displays peaks of the argument "Review Bomb" on Google Trends across the year 2020: most of them are video games.

Figure 2. Events associated with peaks in popularity of the research on Google on the argument 'Review Bomb'.

Source: Tomaselli et al., 2021.



The proposition here is that, in the mindset of the bomber, the RB is a gamified social and political conflict in a gamified environment, too.

According to the 'scheme of gamification' in Robson et al. (2015):

- The mechanics of the game: the rating metric is like a global score and users can move it towards 0 or 10 with their 'votes', one vote for each account. The rating metric does not reflect anymore a latent feature of the item but the strength of the leading faction.
- The dynamics of the game: users will call for help as much as possible. Among the tactics of the players, they can try to gamble the game with spam reviews, or they can try to persuade the undecided with their rhetorical skills.
- The emotions in play: gamification approaches attempt to encourage participants' engagement, giving the opportunity to actively interact with a specific service, e.g., a brand (Alsawaier, 2018; Kujur and Singh, 2016), and leading users to experience different emotions and motivations (Papanoum, 2019). In the RB context, users have strong motivations to think they are on the right side. Negative bombers (low scores) can think that they are fighting against a corrupted system, while Positive bombers (high scores) can think that they are fighting for social justice.

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Finally, it can be said that these emotions involve so many people with a *gamified mind-set* in a tug-of-war game.

**DATA ANALYSIS****Features of the Dataset**

The dataset is a corpus of 59,687 English reviews. 70k reviews were extracted from Metacritic with R package *rvest* on April 1<sup>st</sup>, 2021. Packages *clld3* and *rlang* were used to identify reviews written in English. The dataset has 5 variables, listed in Table 1.

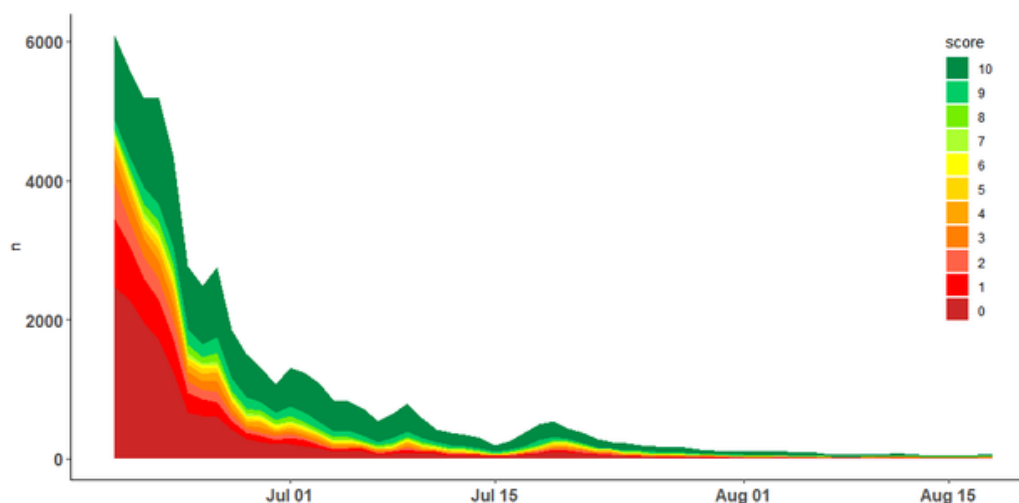
Table 1. Variables in the corpus dataset

Variable	Description	Type
ID	Username of the account	String
Date	Day of submission of the review	Date
Score	A value submitted by the user to TLOU2 in the range [0:10]	Integer
Text	Textual comment of the review	String
Past Ratings (k)	Number of ratings submitted on Metacritic by the account before April 1 <sup>st</sup> , 2021	Count

**Distribution of Scores Across the Time**

As displayed in Figure 3, most of the reviews were submitted before August, with a time distribution that can be approximated by an exponential decay over time.

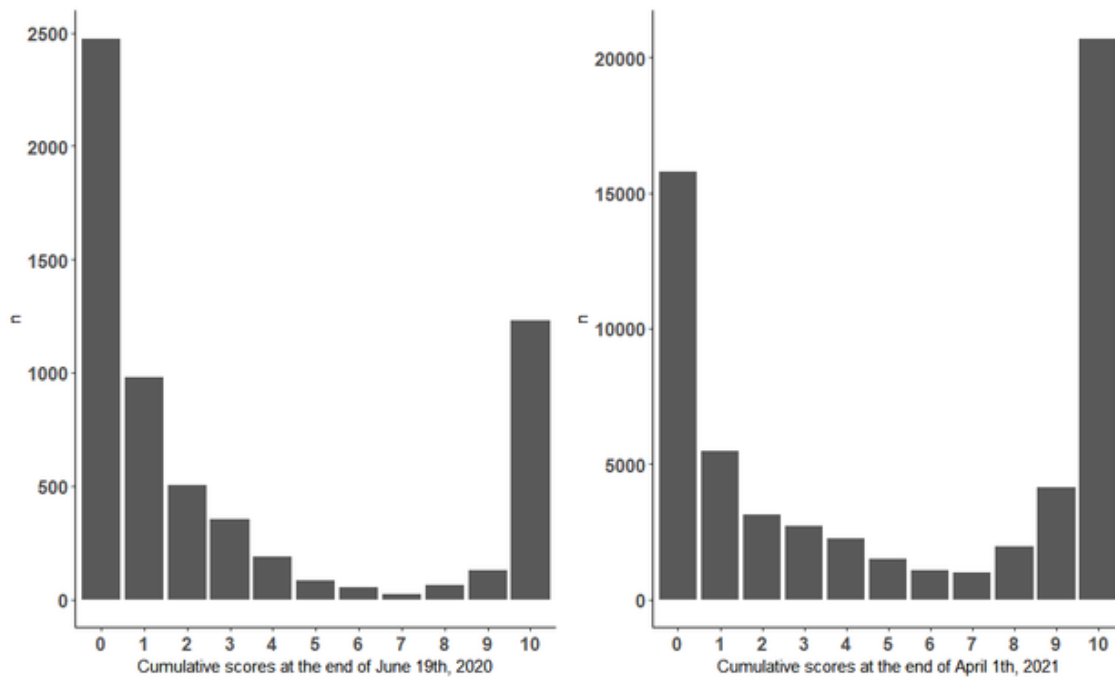
Figure 3. The 11 classes of scores are represented as different shades. Absolute frequencies are represented as continuously distributed across the period from July 19<sup>th</sup>, 2020, to August 19<sup>th</sup>, 2020. After this date, the numbers of new reviews falls into a trivial entity.



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In Figure 3 and Figure 4 can be noticed that 0 and 10 are the two values of the score variable with the largest number of reviews ( $n$ ). On April 1<sup>st</sup>, 2021, these two still have the largest  $n$  but more users rated the item as 10 than 0, resulting into an inversion of the *J*-shape (Figure 4).

Figure 4. A representation of how all the scores submitted to TLOU2 were distributed at the end of the first day vs. at the end of April 1<sup>st</sup>, 2021.



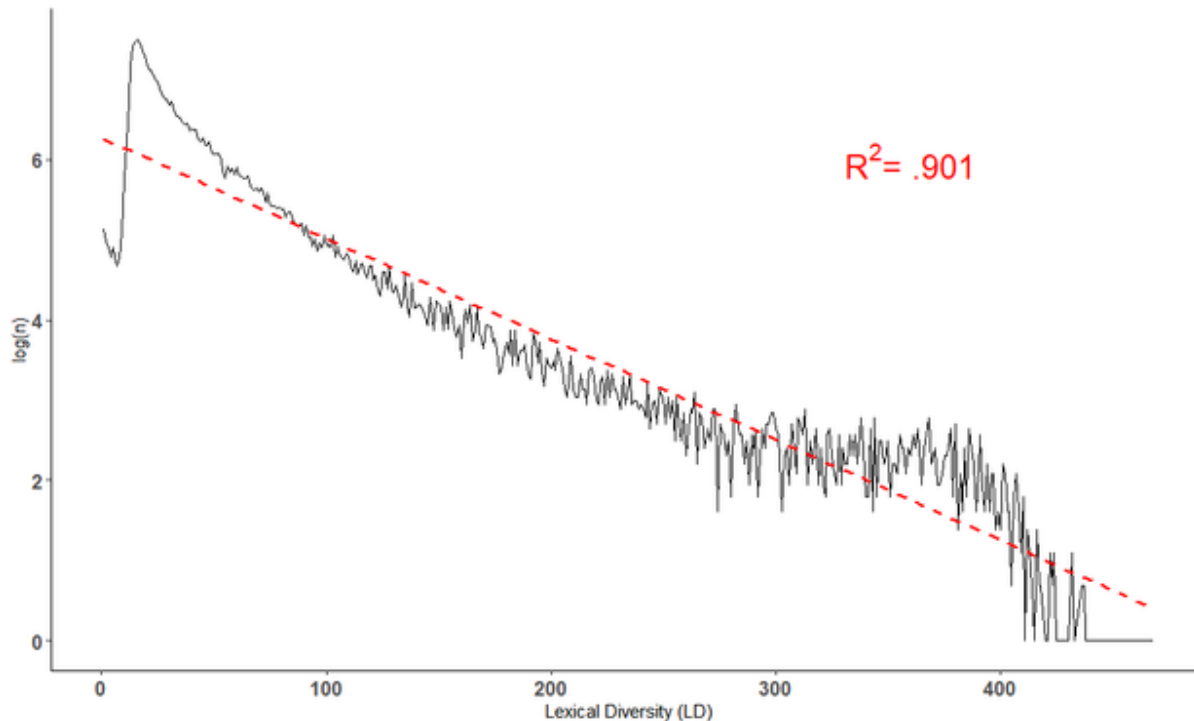
## Lexical Diversity (LD) in the Text

Lexical diversity (LD) is the number of unique unigram tokens (the text between two spaces) in a text. Conceptually, it is the number of unique words of a document (Zhou and Zafarani, 2019). This measure provides information that is similar to the count of characters ( $n$ -char) in the text of review. Indeed, in the dataset the  $R^2$  of the linear fit is .9619 and these quantities grow in a similar trend, aside few exceptions. These exceptions are cases where the text contains a long nonsense sequence of characters. Therefore, LD is a marginally more robust indicator of the user's effort than  $n$ -char.

The distribution of LD in the corpus fits a log-linear model of decay (Figure 5). With exception of reviews with less than 15 words (right side of Figure 5, before the peak in y-axis), there is a statistical regularity between the effort put in the review and the likelihood to write a review, with the reviews with 15 words being the most frequent in the corpus, and the frequency decreasing at the increase of the number of words.

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Figure 5. Lexical diversity is the number of different words. The number of reviews (y-axis) is represented in the log-scale. The exponential decay model fits well ( $R^2 > .9$ ) the distribution of LD.

**Past Ratings (k)**

The number of Past Ratings is equal to the count of all the ratings from an account in Metacritic that are not TLOU2, and it is denoted by  $k$ . Since TLOU2 was published in June 2020 but  $k$  is collected in April 2020, there may be ratings that have been submitted to Metacritic after TLOU2. In the dataset, this variable has an extremely skewed distribution, with more than 68% of accounts having been signed up on the website to only review TLOU2 (Table 2).

Table 2. Distribution among users of the number of ratings (i.e., reviews to another item).

	Number of Ratings (k)					
	k = 0	k = 1	k = 2	k = 3	k = 4	k => 5
n	40961	7613	3003	1720	1105	6390
f	.686	.128	.050	.023	.018	.107

The major discriminant in  $k$  is between  $k = 0$  and  $k > 1$ , indeed. There is no dependence between the value assumed in the score variable and this binary classification ( $p$ -value of Chi-Square test is .232, see Table 3), neither there is correlation (Pearson: 0.002, Kendall: -0.032) between  $k$  and the value of score.

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Table 3. Cross-distribution between two classes of users (with and without reviews to other items) and scores.

	Score										
	0	1	2	3	4	5	6	7	8	9	10
n(k = 0)	10791	3661	2057	1748	1328	883	582	530	1345	2976	15060
f(k = 0)	.263	.089	.05	.042	.032	.021	.014	.013	.038	.072	.367
n(k > 0)	4982	1805	1060	968	927	602	483	456	625	1172	5646
f(k > 0)	.266	.096	.056	.052	.049	.032	.026	.24	.033	.062	.301

The interpretation of statistics in Table 3 is that the quota of accounts  $k=0$  has been influenced by pushes towards both very positive and very negative reviews. Scores that Metacritic considers neutral (5, 6, 7) are proportionally overrepresented among in the class  $k > 0$ . Score = 10 is underrepresented for  $k > 0$ .

## Method of Detection of Clusters of Reviews

To label the text variable, the corpus is processed according to an approach that mixed pre-processing text vectorisation into tokens and Bag-of-words (BoW) counting techniques (Silge and Robinson, 2017). Each comment from each user is represented as a vector of tokens, i.e. sequences of symbols (alphanumeric, or also blank spaces, etc.). Stop words (e.g., “ the ”, “ not ”, “ do ”, etc.) are then removed (i.e., replaced with a blank space) in the vector.

After counting the frequencies of singular tokens between two blank spaces (unigrams) and token combining 2 words separated by a blank space (bigrams) in the whole corpus, peculiar tokens are labelled as elements of a Vocabulary (see, Table 4). Each comment with at least a labelled word is then excluded from the observed corpus for next iterations of BoW counting. The process is iterated until at least ~50,000k comments had at least a token within labelled in a meaningful way. Iteration after iteration, by counting frequencies only of tokens in comments incrementally harder to label, is possible to discover very meaningful ‘niches’ of linguistic patterns as slurs and jargon which are both meaningful and statistically relevant in the corpus.

On the construction of Vocabularies, the concept of Metatalk was regarded as relevant for reviews in RB. Metatalk is opposed to technical topics of reviews, which focuses on the criticism of contents within the reviewed item (and not outside of it). Two vocabularies of words associated with Metatalk and Technical jargon are displayed in Table 4. Tokens are ‘truncated’ because, through this feature, misclassification due to typos by the users is reduced. In some cases, typos (e.g., “grafic” instead of “graphics”) were directly included in the Vocabulary, instead.

**Review Bomb***Table 4. Vocabularies for two classes: Technical and Metatalk (including LGBTQ, Politics)*

Vocabulary	Tokens
Technical Jargon	abbi, abby, actin, actor, ai, animat, antagonist, atmospher, boss, bugs, character, cinematic, clich, collectibl, combat, cut scene, cutscen, design, dialog, dina, dinah, ebby, ell, environment, execut, fireflies, flashback, flaw, frame rat, framerat, game play, gamebreak, gameplay, gaming exp, gampl, glitc, golf, gore, goty, grafic, graphic, hero, improvemen, innovative, jess, jj, joe, killer, lev, linear, loot, manni, mechani, melee, motion blu, murderer, music, narrat, open world, openworl, pathin, performa, platin, plot, protagonist, puzzle, realistic, sandbox, script, sideque, storyl, storytell, structur, technic, tomm, villain, visual, worldbuild, writin, yara
Metatalk (LGBTQ)	androge, bigot, bisex, cis, degenerate, dyke, erotic, fag, femenin, gay, gender, hetero, homo, homophob, homophon, homosex, hulk, inclusi, intersex, kiss, lbgt, lesb, lezb, lezz, lgbt, masculin, musc, non-binary, nonbinary, pedo, porn, queer, same sex, sex scene, sexual, shemale, sodom, stereotyp, taboo, trann, virgin
Metatalk (Politics)	activis, agenda, anita, asian, censor, far-right, fascis, feminis, freedom of, gamerga, globoho, idealo, idelo, ideol, jew, justice war, kike, lectur, moral, nazi, nazis, pc, politic, politic, progressiv, propagan, propogan, racis, religio, retcon, sanders, shill, sjw, social, socialis, sponsor, trump, virtue sign, white man, white men, woke
Metatalk (Other)	0s, 10s, 19th, are mad, balanc, bandwag, bann, bias, bigot, blind, bomb, bots, bottin, boycott, brigad, comment, communit, complai, controvers, criticis, criticiz, critics, critiq, crybab, divisiv, downvot, fake, first day, frustrat, grade, hater, hating, ignore the, immature, incel, industry, jedi, journal, leak, metacri, moron, overreac, people, people who, polar, propaganda, ratin, review, sabotag, salty, scor, star war, statisti, stats, streame, the 0, troll, user, who hate, who say, whoever say

The two labels are not mutually exclusive (or: they are fuzzy), with:

1. 6,497 reviews labelled as Metatalk but not Technical, with a median LD equal to 26;
2. 21,102 reviews labelled as Technical but not Metatalk, with a median LD equal to 31;
3. 21,572 reviews with both labels, with a median LD equal to 80;
4. 10,516 with no label, with a median LD equal to 18.

The higher the effort to in writing the review (i.e., the longer the review), the more users felt appropriate to both judge technical features of the item and to take part in the external debate.

There is an open debate if fuzzy clustering (or soft clustering) is appropriate for short texts (not only reviews, but also comments, tweets, etc.) instead of hard clusters (i.e., mutually exclusive clusters). The general issue with fuzzy clustering is that it lacks statistical reliability and meaningfulness due to the low frequencies of word occurrences (Qiang et al., 2020). The implication of adoption of hard clustering for short texts is that the short text could discuss different topics, but there is always only one core topic that characterize short text.

The Technical label is characteristic of content for reviews of a video game, while Metatalk is the characteristic content expected when a Review Bomb occurs (Steam, 2017). The second is a specific case of the first, which is the general case. So, while is not peculiar that many reviews (42,674, sum of group 2 and 3) discussed technical features of the video game, it is of interest that, giving that the bombing happened, there are 21,572 users (group 2) that reviewed ‘correctly’ the video game without referencing features associate to RB. Merging groups 1 and 3, there are three hard clusters that characterise:

- reviews explicitly engaged in the discussion of RB (group 1 plus group 3)
- reviews from users that ignored RB and focused only on the video game (group 2)
- reviews avoiding both the two characteristic topics of the case (group 4)

**Review Bomb****RESULTS OF ANALYSIS**

Combining the three hard clusters with the information scores, the dataset is partitioned into 7 archetypes of users (Table 5).

*Table 5. How descriptive groups of users (archetypes) are constructed combining labels and scores.*

Archetype	Condition	Description	n	%(n   k = 0)	Median LD
Attacker	Metatalk = T, score < 5	Willing to boycott TLOU2	11,916	.662	52
Defender	Metatalk = T, score > 7	Hinder attempts to boycott TLOU2.	13,156	.722	63
Disappointed	Metatalk = F, Technical = T, score < 5	Disliked TLOU2 but tries to explain the reasons in an objective way.	8,606	.717	30
Enthusiast	Metatalk = F, Technical = T, score > 7	Liked very much TLOU2 but tries to explain the reasons in an objective way.	10,026	.674	30
Neutral	5 < score < 7	Less interested in taking a side, more in providing their opinions.	5,791	.574	70
No Label (Negative)	Metatalk = F, Technical = F, score < 5	Likely Disappointed but did not provide a sufficient explanation.	5,130	.703	18
No Label (Positive)	Metatalk = F, Technical = F, score > 7	Likely Enthusiast but did not provide a sufficient explanation.	5,062	.733	19

From the statistics in Table 5, it can be noticed that, while Defenders have a higher propensity to recruit accounts in the k=0 group than Attackers, this relationship is inverted between Disappointed and Enthusiasts. There are two possible explanations for this empirical observation:

- Negative review bombers (i.e., Attackers) influenced the cognition of the item. A distaste in elements outside the video game induced a more critical reception of the technical elements of the video game.
- Disappointed accounts are dissimulating their real motivations behind the low score.

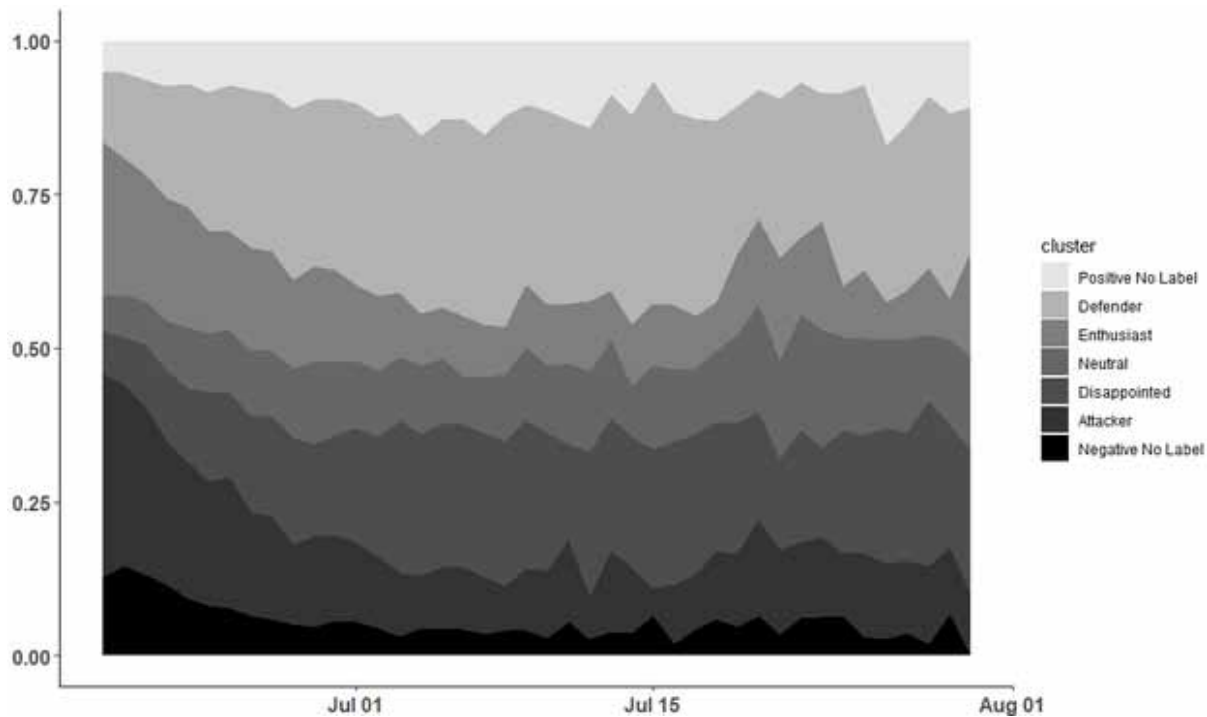
In absence of more accurate relational data (at individual level), the second explanation seems tempting, but the first one has an empirical validation in the actual dynamics of the distribution of the archetypes across the time. In Figure 6, the daily proportion Archetype displays prevalence of Attackers in the first 10 days. While Attackers progressively retreat until stabilizing in July, the quota of negative reviews does not really decrease a lot. Their role is taken from Disappointed users, who stop to mention topics like Politics or LGTBQ and focus on technical criticism of the video game. A possibility is that, as a collective strategy, negative review bombers they gave up on discussing political/ethical issues after realizing that they were unable to boycott sales (indeed, they sparked interest for it!). By this time, too



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involved in the tug-of-war game, they may have collectively realized they had to send a different message to be credible.

*Figure 6. The continuous day-per-day relative frequencies of the 7 archetypes are represented as different shades in the period from July 19<sup>th</sup>, 2020 to August 1<sup>st</sup>, 2020.*



As a relevant note, the Neutral Archetype is particularly important because, since it has no power to pull the rating metric (which is general dynamic that users are plying in this gamified environment), it represents a baseline value to measure the interest of  $k=0$  in the case of TLOU2 on Metacritic. Since Neutrals lack intentions to boycott TLOU2 or ‘game’ Metacritic, the relatively high value of % ( $k = 0$ ) means that it is plausible that a not trivial portion of users that rated only TLOU2 on Metacritic where genuinely and not necessarily maliciously interested into contribution with their own opinion, regardless of whether it was positive or negative.

The paradox here is that, exactly how described by Steam, the final effect of RB over TLOU2 was to trigger a very large discussion over its own and flaws.

## **SOLUTIONS AND RECOMMENDATIONS**

The problem presented here can be approached from various perspectives. From the point of view of the technology of measuring consumer opinion, the main interest is to allow the rating structure (be it a recommendation system or even a simpler technology) to better identify legitimate contributions and

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spam. One of the problems with multipoint scales in measuring satisfaction is that it is difficult to differentiate cases in which there is a genuine distaste for the item from cases of strategically oriented voting. In this case, any increase in the number of scoring classes helps make this distinction less ambiguous.

Scales with more than 11 classes (e.g., 0 to 10) are, however, very atypical and can present serious problems of interface. Put simply, they are very confusing for the user experience. With the transition to digital technologies, it is possible that slider tools, which make it easier to allocate preferences, will replace multipoint scales. The underlying theory is based on a fundamental principle: on a slider scale from 0 to 100, identifying the satisfaction of an item at 0 should be a much rarer event than voting 1 out of 5. Systematic inflations of some values in a slider could be an important alarm of a spam voting. Unfortunately, this solution is effective only outside cold-start conditions.

The type of analysis proposed in this paper has resulted in a decomposition of the corpus into archetypes. Although this decomposition is essentially descriptive in nature, it can represent a good starting point for the development of spam detection techniques.

Beyond the technical problem of identification, there is the topic of the gamified conflict. Much has been said about the conflict between groups of individuals, but this research leads to another latent dimension of the conflict: that between one's past and present opinions. In other words, the conflict among groups may be the result of unfulfilled expectations in individuals. The researcher's task here is not to judge the validity of these expectations or the choices of the producer, but to increase the knowledge and the possibilities of quantifying opinion's dynamics. Recalling Steam (2017) words: "Players doing the bombing are fulfilling the goal of User Reviews - they're voicing their opinion".

Most of RSs do not sufficiently consider the possibilities of quantifying an individual expectation before experiencing the item. Here it is proposed to allow users of sites such as Metacritic to express one, or even more than one, expectation of the score towards a future object. The system can compare this expected score with the final score after having experimented the item.

In this regard, it can be very useful to collect open data on the impact of a new advertising trailer. How many people got interested after a specific event, like the release of a trailer? And how has the global expectation changed?

Applied to our case study, it would have been crucial to know to what extent the ideological conflict arises from the impact of the advertising campaign versus the cognitive manipulation effects of the bombers. It is worth noticing that similar gamified phenomena and impacts can be also found in relation to other fields, for example in political debates, during election campaigns, where gamification strategy may be promoted by leaders, affecting users' - then electors - behaviours (Loh, 2019; Grisolia and Martella, 2019).

## **FUTURE RESEARCH DIRECTIONS**

Studies on political polarization in social media would welcome the topic of the manifestation of latent social or political conflict through reputation systems and/or gamified environments (e.g., video games themselves but also gamified apps...). Political polarization as a period of increase of radicalization of political beliefs is a topic covered all along the 20th century. The sociodemographic phenomenon has been linked to the individual mechanism of group polarization as originally formulated after the experimental results of Moscovici and Zavalloni (1969): the exposition to debates does not promote

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convergence towards common grounds, instead it radicalises pre-existing beliefs in subjects. Bail et al. (2018) demonstrated that this is the effect of social media on political beliefs.

On the technical side, of great relevance is the topic of detection of spam reviews. While there is a growing stock of knowledge on the approaches for the automation of this process, from empirical research it seems that the new possibilities of misinformation are going at least as fast as the technical innovations in detection. Surely a solid approach is based on the identification of distinct topological structures in the possible relational schemes of reviews (Varol et al., 2018).

The dataset under consideration, while revealing many things about the trend of the population of reviews as a stratified agglomeration, lacks both a relational structure and the exact temporal order in which the reviews have been submitted, since the time variable is approximated per day, not per second.

The research over Archetypes (hard clusters) of users in Review Bomb has a value on its own. Five Archetypes (plus two residual Archetypes) haven been individuated after recognition of the general metalinguistic patterns of Review Bombing as expressed in the Steam's statement (2017). While the 'how' Metatalking can be identified in reviews can be context-dependent, the validity of this construct and its contraposition with the Technical label can be generalized as a standard approach to measure the influence of persuasive intents over items typically attacked by review bombers. In other words, while there are many sub-topics associated with Metatalking and Technical-talking and there are many methods for assigning the labels, the method of stratification of the population of reviews into Archetypes has the potential to become a standard for analysis of misinformation in gamified environments.

## **CONCLUSION**

This chapter has developed a consistent and generalizable methodological approach to empirical research on the problem of Review Bomb. This has been possible through the study of relevant theoretical concepts taken from the field of information studies and decision systems, and through the insights from quantitative data analysis of a relevant and complex case study.

It is evident that the Review Bomb can not be considered neither only a technical problem, nor a mere manifestation of social distress. In this regard, the framework of gamification provides key insights to understand the dynamics of the phenomenon. Of particular relevance in this study is the concept of archetypes: these are stratifying (or "clustering") variables for the population of users. They constitute the link between theory and method, since archetypes as labels far data actually reflect the theoretical role that users decided to 'play' in the gamified conflict. Hopefully, this scheme can be generalized for virtually all the cases of Review Bomb, with a use for inferential methodology, too. For example, arguably the most relevant archetype is the neutral: since neutral users are people who refuse to play the game of distorting the rating metric, their statistics likely represent the best natural control (or baseline) to infer quantitative effects of Review Bomb, e.g., in quantifying the presence of illegitimate accounts, fake reviews, etc.

It is also important the construct validity of the Metatalk category. Presumably, the best theoretical framework to refine what exactly 'metatalking' is the distinction between judgements of merit (or technical inferences, objective valuation) and ideological judgement (or judgement according individual or societal norms, customs, ideas, and social values). However, Metatalk as a label overcomes this naive division and it welcomes a feature of increasing importance in the 'society of information': namely the role of the communication of these ideological positions. When a user expresses a judgment as herding

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or in opposition to another user, plausibly this decision is still following an ideological justification, or at least is motivated by social values, although this is not necessarily clearly expressed in the text.

The ability to identify sentences referencing to a socialized behaviour (i.e., an ideological position) as a kind of judgment that differs from the request for an evaluation of merit can represent a fruitful development of detection algorithms, overcoming the cold-start problem.

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**KEY TERMS AND DEFINITIONS**

**Cold-Start:** A terminology to refer the difficulty to make algorithmic inferences for new uses or items about because there is not sufficient information. In some algorithmic application, this difficulty is not temporary but permanent, due a majority of illegitimate accounts, e.g., detection of sock-puppets.

**Gamified Conflict:** A social situation defined as a real conflict (i.e., not a play) but that, even without the parties noticing, follow the structure of a game. For example, in a gamified conflict, people can always get quantitative information of how the side are scoring a performance regarding the conflict.

**Illegitimate Accounts (Shills and Sock-Puppets):** Accounts made for sabotaging the correct functioning of a rating system. Shills are users who trade their rating rights submitting reviews or ratings of items they have not experience with, while sock-puppets are accounts controlled by the same physical person.

**J-Shape:** A name for a two-dimensional distribution of values that fits well a convex shape. When the two extremes of the distribution are equal in value, it can be referred as U-shape, too.

**Metatalk:** When someone is requested to provide a justification on a judgment of merit over an item, and the justification mentions elements that are expressed as partially or totally disjointed to the merit proprieties of the item. Not only ideological judgements are considered metatalking in this context (“The use of this item goes against my moral ideas”), but also any expression of dependency to judgements provided by others (“I value this like that because a third party valued it like that”).

**Rating Systems, Recommender Systems (RSs), and Rating Aggregators:** Rating systems are those systems devoted to the collection of ratings data from users. A recommender system is any system whose state of existence is tied to predictions about the future ratings or the propensity of satisfactory response from a population of users towards a catalogue of items. Such predictions are usually inferred from past ratings from users in the systems. It could be said that the rating system is an important sub-system of the recommender system. Rating aggregators are platforms aimed at algorithmic measurement of public estimates of collective ratings on items. These measurements can be ranked into charts, and items topping the charts are considered the best or the most recommendable items in their group or typology.