Mazarakis, Athanasios; Bräuer, Paula; Dorsch, Isabelle

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Evaluation of gamification as a tool for open access publishing among researchers: insights from a conjoint analysis

Athanasios Mazarakis[1] · **Paula Bräuer**[2] · **Isabelle Dorsch**[1]

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Abstract
The recent developments in the scientific system have been characterized by an increasing openness, with open access (OA) publishing emerging as a central principle. OA represents an alternative model for publishing research articles, diverging from the traditional subscription-based model. While positive developments have been observed, obstacles for OA remain, including elevated publication costs and the imperative to publish at the highest level in the scholarly community with a significant impact. To overcome these obstacles, it may be beneficial to consider using non-monetary incentives, such as gamification, to promote OA publishing. To address this challenge, an experimental study employing a conjoint analysis has been conducted to investigate the impact of various gamification options on researchers' publishing behavior. The study utilized a sample of $N = 356$ subjects. The results demonstrate that the Journal Impact Factor (JIF) is a dominant criterion for determining where to publish. However, gamification, particularly in the form of badges associated with an article, can also significantly influence journal selection and support OA. Additionally, qualitative data was collected to identify other factors influencing the choice of a journal for OA from the perspective of the participating researchers in the experiment.

Keywords Open access · Gamification · Incentives · Academic publishing · Conjoint analysis · Open science

✉ Athanasios Mazarakis
academia@mazarakis.de; a.mazarakis@zbw.eu

Paula Bräuer
pbra@informatik.uni-kiel.de

Isabelle Dorsch
i.dorsch@zbw.eu

[1] ZBW – Leibniz Information Centre for Economics, Kiel, Germany

[2] Kiel University, Kiel, Germany

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Introduction

The increasing importance of open access (OA) publishing within the scholarly community has given rise to a vigorous discourse concerning the most effective means of encouraging researchers to prioritize OA over traditional subscription-based journals, with citation impact and reputation of journals being still essential considerations when selecting where to submit research for publication (Zhu, 2017). Although the advantages of OA are well-documented, including increased visibility, enhanced accessibility, more citations, and potentially broader societal impact (Huang et al., 2024; Piwowar et al., 2018), many researchers remain hesitant to adopt OA. Common concerns include the costs associated with publishing, particularly Article Processing Charges (APCs), and the perceived prestige of subscription-based journals, which are often tied to established metrics, such as the Journal Impact Factor (JIF) (Greussing et al., 2020; Zhu, 2017). These concerns create a persistent tension between the ideal of making research freely available and the practical realities many academics face, particularly early-career researchers or those without institutional support for APCs (Frank et al., 2023).

Therefore, it is not surprising that a recurring theme in the open science (OS) community is the lack of incentives for researchers to make their research, data, or software openly available (Joseph, 2021; Leonelli et al., 2015; Stirling, 2024). For example, academic incentive systems prioritizing the quantity of publications and impact factors above the quality or rigor of research may hinder the acceptance of OS (Robson et al., 2021).

In addition, despite the growing recognition of the importance of OA, researchers are often not adequately rewarded for contributing to it, which raises the question of whether the lack of adequate rewards for OA might affect their career when publishing OA (J. Kim, 2010; O'Hanlon et al., 2020). The current academic reward system remains heavily weighted toward high-impact, subscription-based journals, and many institutions prioritize these metrics in hiring, promotion, and funding decisions (Rice et al., 2020). This misalignment of incentives presents a significant barrier to the broader adoption of OA practices. Moreover, the reputation of a journal is a crucial factor that researchers consider when selecting a journal for publication (Rowley et al., 2022). In light of these challenges, it is crucial to identify new strategies to influence researchers' decisions regarding publication venues and advance the OA community. However, there has been little research into how to incentivize OA publishing and how this might be implemented to promote a behavioral change toward OA (Cook et al., 2018).

One promising strategy for promoting behavioral change is the use of gamification, which is the use of game design elements in non-game contexts (Deterding et al., 2011). Gamification is already being used successfully to increase engagement and participation in various areas such as education (Sailer & Homner, 2019), marketing (Conaway & Garay, 2014), and healthcare (Lowensteyn et al., 2019). The concept of gamification is not a novel one within the OA domain. Indeed, preliminary empirical studies have already been conducted to enhance motivation for OA by applying gamification techniques (Mazarakis & Bräuer, 2020a, 2020b). The potential benefits of gamification in the context of academic publishing include the accumulation of points, the display of badges, and acknowledgment on academic profiles. These benefits may serve to motivate researchers to publish more frequently in OA journals. Nevertheless, it remains unclear how scholars make decisions in specific situations when presented with a choice between several publication options that favor OA.

Although the concept of incorporating gamification into an incentive structure for researchers has merit, it is essential to situate this discussion within the broader historical and policy context of OA. In the last decades, OA has evolved significantly and has been shaped by various global and institutional efforts to make scientific knowledge freely available (Tennant et al., 2016). This progression has been influenced lately by technological advancements, international collaborations, and policy shifts, such as the COVID-19 pandemic's temporary free access to OA publications (Blasetti et al., 2020) and the 2021 UNESCO Recommendation on Open Science, which calls for a more equitable and inclusive global science community (UNESCO, 2021).

In light of the ongoing development of OA, the sustained necessity for incentives to motivate a greater number of researchers to publish in OA journals, and the favorable outcomes that have been attained through the use of gamification in other domains, the following research question was formulated for our study:

What is the impact of gamification on researchers' decision-making processes when selecting between OA and traditional subscription-based journals?

To answer this research question, a study was conducted in which researchers were presented with a range of publication options from which they could select their preferred choice. Based on the choices made, the influence of different factors, such as gamification design, is then derived.

After the introduction, we present in the following related work chapter an overview of the history and evolution of OA, highlighting the major trends, policies, and technological innovations that have shaped the current OA landscape. This background will serve as a foundation for examining how emerging strategies, like gamification, can further advance the OA and OS communities and address persistent barriers to its widespread adoption. The method chapter briefly introduces the experimental design, including the choice-based conjoint analysis and Cox regression, the general procedure and the supplementary questionnaire employed to gather qualitative data, the data cleansing process, and the final sample subjected to analysis. The subsequent chapter presents the findings of the conjoint analysis, accompanied by qualitative results. These findings are explored in the discussion chapter, wherein the limitations of the study are also addressed, along with a prospective outlook. The concluding chapter offers a synthesis of the entire study.

Related work

This chapter presents the first OA definitions and developments. In addition to providing a brief historical overview, it also addresses contemporary developments. The subsequent section presents an overview of gamification research's current theoretical and practical developments.

OA Definitions and developments

OA has a long history within the OS community, rooted in the early '90s/'00s (Gong, 2022; Tennant et al., 2016). Over time, different, more strict, or loose OA definitions are established, refined, and even superseded or never asserted fully (Piwowar et al., 2018). Broadly speaking, OA allows one to read research articles online for free on the publishers' website or in a research repository (Piwowar et al., 2018) without any financial, technical, or legal barriers (Herb & Pampel, 2022).

It is important to note that OA is not a homogeneous concept. Instead, it encompasses a range of sub-categories at the level of both publication and publisher. Considering the journal level, a journal can be entirely OA, meaning that all articles are open; entirely closed, requiring a subscription to the journal or to pay a fee; or hybrid, being in general closed but with the option for authors to make their article OA (Maddi, 2020). On the article level, the classification into Gold, Green, Hybrid, Bronze, and Closed is established (Piwowar et al., 2018, p. 5), even though no strictly consistent definition of these categories exists within the research community (Herb & Pampel, 2022; Priem, 2021). Gold articles are published in an OA journal. Green articles are free copies of the published toll-access version of records or accepted manuscripts, or preprints with or without a license in an OA repository. Being free to read and having an open license in a toll-access journal constitutes Hybrid articles. Likewise, Bronze articles are free to read, sometimes with delayed access, but no transparent identifiable license exists, and the publisher can revoke the reading access anytime. Articles not free to read on the publisher's website or in an OA repository are labeled Closed, including articles and manuscripts shared on an academic social network or Sci-Hub (Piwowar et al., 2018; Priem, 2021).

As the definitions show, the reliability of OA information varies, with the Gold status being more stable and reliable, while Bronze OA is volatile by nature (Maddi, 2020; Sanford, 2022). The stated OA categories inherit different reader- or author-based paying models. Authors pay article processing charges (APCs) for publishing in Gold or Hybrid, while Closed articles require a toll-access from the reader (Maddi, 2020). From the perspective of the author-paid APC model, it is also referred to as "knowledge tax," disadvantaging researchers paying the APC by themselves as they lack funding or work in a lower- or middle-income country (Shu & Larivière, 2024).

For a long time, there has been an implicit understanding that Green and Gold OA are the possible main routes to OA (Pinfield, 2015). However, Diamond OA exists, which has received more and more recognition lately. The term Diamond OA was coined by Fuchs and Sandoval (2013) over ten years ago in 2013, and even longer back in time, it was already referred to as Platinum OA (Haschak, 2007). Back then, Diamond OA was suggested as one non-profit specification of the then-Gold OA, considering no fees for readers and authors (Fuchs & Sandoval, 2013). Today, it is still classified as being free for authors and readers with publishing costs taken by grants, governments, subsidies, or communities and the claim to have a deeper analysis and reflection about what constitutes Diamond OA (Simard et al., 2024).

With the establishment of the different OA routes and their implementation into the academic publishing system, it is necessary to carefully consider the set-up of OA systems and services and their role in being as effective and equitable as possible. The views on OA vary across and within different actor groups. It would be erroneous to assume that there is a homogeneous group of OA supporters. Instead, critique is concerned with identifying and addressing barriers to participation and instances of epistemic injustice (Pinfield, 2024).

Another way to promote and make OA more widely available is by using OA mandates. According to Mering (2020), "OA mandates are policies adopted by research institutions, universities, or funders that require researchers to provide free, unrestricted access to their published research by publishing in OA journals, depositing their articles in an OA repository, or both" (Mering, 2020, p. 157). So, unlike policies, they are a publishing requirement by the institution or funder. Funder OA mandates incentivize researchers to comply, as otherwise, funding for a grant provider is no longer provided, with Plan S maybe being one of the most prominent OA mandates (Mering, 2020, p. 158). Nevertheless, mandates put

pressure on researchers to follow specific rules and procedures. This results in a behavior change, which might not be voluntary. In contrast, gamification helps to change behavioral patterns without the same pressure, as the following section describes.

Gamification

The motivation of individuals to perform specific tasks is a recurring challenge in various contexts. Gamification is a method that incorporates game design elements to create non-monetary incentives to enhance motivation and encourage individuals to perform the tasks in question. According to Deterding et al. (2011), gamification is considered as the use of game design elements in a non-game context, which represents a transformation in the corporate and academic landscape, encompassing alterations to organizational structures, operational procedures, and the provision of services to establish a framework that emulates the hallmarks of successful gameful experiences (Huotari & Hamari, 2017). The success of gamification can be attributed to several psychological mechanisms, with the most frequently applied theory in gamification being the Self-Determination Theory (SDT) (Mekler et al., 2017, p. 2). According to SDT, individuals can be motivated by both intrinsic and extrinsic motivation (Deci & Ryan, 2000).

By incorporating game design elements, such as points, badges, rankings, and challenges, the intention is to motivate users to adopt new behaviors (Mazarakis, 2021). However, in the development of gamification concepts, creating a complete game is not the objective; instead, the emphasis is on utilizing specific game design elements (Palmquist, 2021, pp. 1379-1380). Usually, points, badges, and leaderboards, which are also known as the PBL triad (Liu et al., 2017; Werbach & Hunter, 2012), represent the most frequently examined game design elements in the context of gamification research (Koivisto & Hamari, 2019; Mekler et al., 2017).

The concept of utilizing badges as a motivational tool to encourage the adoption of OS practices has been previously examined in academic research. However, it is notable that the findings of these studies do not always align consistently. For example, in their 2016 study, Kidwell and colleagues investigated the impact of badges on the open provision of research data for a scientific journal in psychology. To this end, the researchers compared the number of publications that made their associated research data freely available before and after the introduction of badges. While this was the case for less than 2% of the data before the introduction of badges, this statistic increased to over 39% after their introduction. The study demonstrated that the introduction of badges led to a significant increase in publications, making their research data available (Kidwell et al., 2016).

Another study that also examined the impact of badges on promoting the dissemination of research data was conducted by Rowhani-Farid et al. (2020). The authors conducted a randomized controlled trial, inviting authors to make the data from their articles freely available via email after publication in an OA medical journal. The experimental group was offered a badge in exchange for publishing the data, while the control group was not. In contrast with the findings of Kidwell et al. (2016), the researchers observed no notable increase in the provision of research data in the badge group relative to the control group. The authors hypothesize that the discrepancies between disciplines, particularly the distinction between psychology and medicine, may have contributed to these variations. In psychology, the practice of sharing data has become considerably more prevalent (Hardwicke et al., 2018; Tedersoo et al., 2021).

Mazarakis and Bräuer (2020a, 2020b) employed badges to foster awareness and engagement with the concept of OA among researchers. In an experimental setting, the researchers utilized both badges and a progress bar to motivate researchers to respond to more questions in an OA quiz. Incorporating these game design elements resulted in a statistically significant increase in the number of questions answered, thereby indicating a notable enhancement in engagement with OA. This outcome contrasts with that observed in a control group, which demonstrated a lower level of engagement with OA despite completing the same quiz without the inclusion of gamification (Mazarakis & Bräuer, 2020a, 2020b). In general, gamification can enhance the visibility and reputation of an individual, organization, or activity by incorporating game design elements.

Many studies have already demonstrated that context and target groups are of critical importance in the implementation of gamification (Finckenhagen, 2017; Hallifax et al., 2019; Koivisto & Hamari, 2019; Mazarakis & Bräuer, 2018; Richards et al., 2014). It is essential to consider the target group of researchers to utilize gamification to encourage OA publishing practices. A multi-stage study by Feger et al. (2019) explicitly examines this target group and investigates how gamification can be employed to motivate researchers to make their data available for the purpose of reproducibility. The authors demonstrate that scientific challenges, such as ensuring the fair reflection of quality and contribution, must be taken into account if gamification is to be used in a scientific context.

Nevertheless, gamification has also received criticism, e.g., regarding ethical aspects. These aspects have not gone unnoticed (Al-Msallam et al., 2023; Goethe & Palmquist, 2020; T. W. Kim & Werbach, 2016; Mazarakis et al., 2023; Shahri et al., 2014; Thorpe & Roper, 2019) and should be considered when applying gamified tools, software, and solutions. Issues such as manipulation and exploitation of users and participants, as well as psychological stress, are already known (Al-Msallam et al., 2023). Some authors also categorize gamification as a kind of stealth persuasion using not-so-obvious methods (Thorpe & Roper, 2019). This aspect is a topic of emerging priority, as with the wide use of artificial intelligence, gamification will benefit from this technology and will be immersed in artificial intelligence, making it essential to have fields of action in mind for different disciplines (Mazarakis et al., 2023). Recommendations have already been made for the responsible use of gamification, such as creating and implementing a code of ethics (Shahri et al., 2014). In addition, discussions and frameworks have emerged to address the feeling that someone is doing something unintended, especially the feeling of being manipulated, exploited, or generally harmed (Goethe & Palmquist, 2020; T. W. Kim & Werbach, 2016).

The following chapter will demonstrate how gamification and OA can be integrated into an experimental study to gain more profound insights into the publication preferences of scholars and how they affect publishing OA. A qualitative data analysis will also be conducted to enhance the rigor of the findings.

Method

The objective of the empirical study was to examine the potential impact of gamification as an incentive system on OA publishing behavior and to address the research question previously outlined. This chapter provides a comprehensive account of the experimental design, a brief introduction to choice-based conjoint analysis (CBCA), followed by a description of the questionnaire employed in the study and the general procedure, followed by a brief section on data cleansing, and ending with the characteristics of the sample.

Experiment design

The present study employed a CBCA to investigate the potential influence of gamification on selecting an OA journal for publishing research. A conjoint analysis is a method for analyzing individuals' preferences (Backhaus et al., 2015) and is most commonly used in marketing research (Schöbel et al., 2017). In the process of conjoint analysis, subjects are asked to evaluate alternative variants of a product. The product variants differ in various features (called attributes) and their characteristics (called levels) (Green et al., 2001). To illustrate, an individual may wish to create a new chair design. The chair may possess various attributes, including the number of legs and the material from which it is constructed. These attributes can be classified into different levels, for example, a chair with three or four legs or if it is made of wood, metal, or plastic. In the choice-based design variant, the subject is tasked with sorting various products with different attributes and levels according to their preferences. The empirically collected overall judgment can then be used to derive which attributes and levels influence design or purchase preferences according to the experimental setting.

The experimental procedure of a choice-based conjoint analysis was adopted for use in the present study. To this end, an online setting was constructed in which subjects were presented with a range of hypothetical scientific journal publishing scenarios and invited to indicate their preference for where they would most likely publish their research findings. The journals in question exhibit certain distinguishing characteristics. After that, subjects were requested to rank the journals according to their preference for potential publication venues. Each subject completed the selection process 15 times with different sets of three journals. In each run, the subject was required to decide which journal to choose as first, second, and third choice. As subjects were obliged to sort three journals and there was no option to select none, this is referred to as a forced-choice conjoint analysis (Backhaus et al., 2015).

Attributes and levels

In order to distinguish journals, three attributes were defined and utilized in the experiment: JIF, publication fees, and gamification offered. For a detailed overview of these attributes, please refer to Table 1. In addition to the study's subject, gamification, the two non-gamification attributes, JIF and publication fees, were chosen based on their high relevance for publication decisions, as evidenced in the existing literature (Lemke et al., 2021; Triggle et al., 2022; Wijewickrema & Petras, 2017).

The JIF is a bibliometric measure that indicates how often articles in a journal have been cited on average over the past two years (Garfield, 1955, 1972, 1999). Three values

Table 1 Overview of the attributes and levels of the journals used in the conjoint experiment

Attributes	Level 1	Level 2	Level 3	Level 4	Level 5
Gamification	none	OA-level on personal profile	OA-badge on personal profile	OA-points on personal profile	OA-badge on article
Journal Impact Factor	0.0	5.0	30.0		
Publication fees	€0	€1000	€2000	€2800	

have been defined for the JIF attribute: 0.0, 5.0, and 30.0. These values represent three levels and are based on the study by Lemke et al. (2021) for defining JIF in conjoint analysis.

The second attribute, publication costs, represents all costs that have to be paid by the author or a third party (e.g., institution or employer) prior to the publication of an article, which can also be classified as APCs. The values for this attribute were determined based on the results of Kuballa et al. (2017). A total of four levels were chosen: €0, €1000, €2000 and €2800.

Finally, implementing the gamification attribute was more complex. In addition to a non-gamification version, four distinct variants of how a journal could utilize game design elements to incentivize OA publishing were designed based on the most prevalent and effective game design elements identified in the literature (Hamari, 2017; Koivisto & Hamari, 2019; Liu et al., 2017; Mazarakis, 2021; Mekler et al., 2013, 2017; Werbach & Hunter, 2012). The selection of game design elements under examination was confined to three: points, levels, and badges. Five distinct forms were considered for the gamification attribute, including no gamification, display of the OA-level on a personal profile page, display of an OA-badge on a personal profile page, and display of OA-points on a personal profile page. Additionally, the fifth level of gamification in the conjoint analysis is the display of an OA-badge on the published article, which is analogous to the open data badge investigated by Kidwell et al. (2016). It is essential to highlight that the levels of the gamification attribute should not be confused with those of the conjoint analysis. The levels of the conjoint analysis differentiate the various gamification characteristics, whereas the OA-level in the gamification attribute denotes the game design element.

In the context of gamified systems, points are considered an indispensable element. These points possess various characteristics, including the capacity to quantify experience. Furthermore, points serve as a means of maintaining a score, determining the current status, providing feedback, and representing an external indicator of improvement (Sailer et al., 2017; Werbach & Hunter, 2012; Zichermann & Cunningham, 2011). Badges can be described as virtual artifacts that are represented visually and have proven to be an effective method for boosting user activity (Hamari, 2017). Levels indicate progress and function as markers of the current status. Levels provide clear feedback and foster a sense of achievement through the experience of reaching new levels (Zichermann & Cunningham, 2011). Points, levels, and badges are widespread game design elements in gamification (Hamari et al., 2014; Koivisto & Hamari, 2019; Liu et al., 2017; Mazarakis, 2021; Mekler et al., 2013, 2017; Werbach & Hunter, 2012).

An overview of the different gamification options is summarized in Fig. 1. The subjects were also presented with this figure in the explanatory section prior to the commencement of the experiment to provide them with an understanding of the various gamification options. The four icons depict the display of the OA-level on a personal profile page, the OA-badge on a personal profile page, the OA-points on a personal profile page, and the OA-badge printed on the published article. These can be found in the third row at the bottom of Fig. 1. The display of the game design element options remained consistent, with 10 points consistently awarded or subjects nearing the completion of level 5. This presentation format was selected to ensure comparability between individual choices.

Selection of choice sets

Once the attributes and their associated levels were determined, the choice sets were created. In our study, a choice set or choice situation constitutes a set of journals

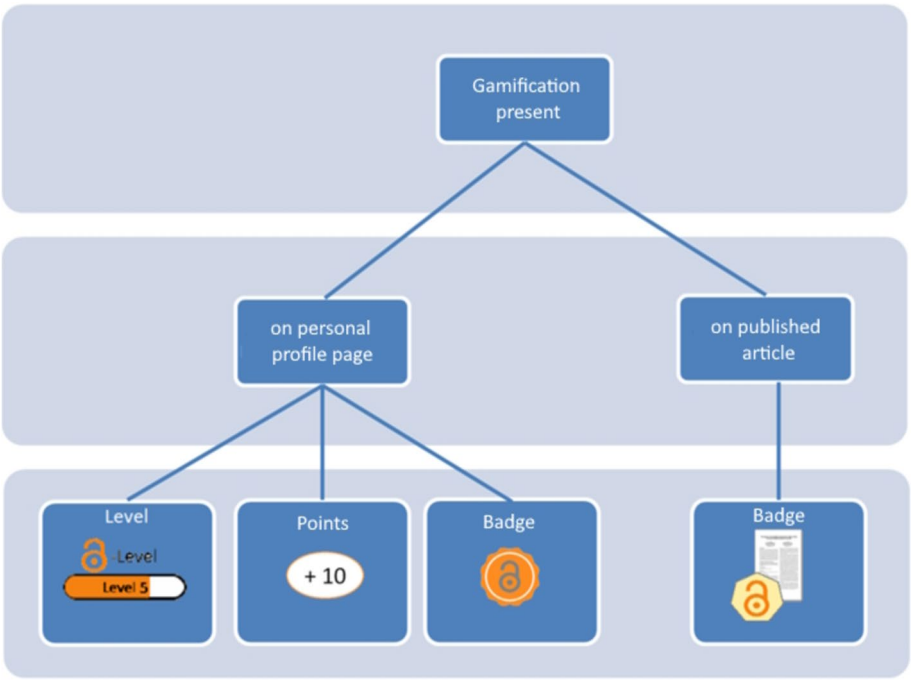

Fig. 1 Overview of game design elements used in the conjoint experiment

(comparable to products in marketing) that are ranked by the subjects. In a CBCA, the subjects rank several such choice sets one after another. Overall, 60 possible stimuli, thus 60 alternatives of journal publishing scenarios, for a fully factorial design (all logically possible combinations of attributes with all possible levels) can be formed from the attributes described above by combining 3 (JIF) * 4 (publication fee/APCs) * 5 (gamification). However, 60 different stimuli resulting in 60 possible choice sets would be far too large for a subject to evaluate. Therefore, a process developed by Aizaki and Nishimura (2008) was used to create the choice sets for the subjects.

To perform this procedure, the number of choice sets to be generated must be specified. According to Klein (2002), with the profile method, the product of the number of attributes multiplied by the number of choice sets is sufficient to estimate the main effect of the attributes reliably. This results in a minimum of 15 choice sets for this study (3 attributes * a maximum of 5 levels; see also Table 1). At 15, the number of choice sets also does not exceed the maximum number recommended to avoid respondent fatigue (Backhaus et al., 2015). Another parameter to be defined is the number of sets presented to a subject at the same time. For this purpose, the design of the study by Lemke et al. (2021) was adopted, and the value was set to three choice sets per iteration. Consequently, a choice set in this study represents three fictitious examples of scientific journals. Each journal is characterized by at least two attributes: the JIF and publication costs. Only in the case of an OA journal the additional attribute of gamification is also present, as the rewards offered are OA-points, OA-levels, and OA-badges. All choice sets that would have combined a €0 publication cost with a game design element were

also manually excluded. This exclusion was made because only OA journals should receive an incentive, and in this experiment, all journals with €0 publication costs were considered closed access.

Choice-based conjoint analysis and cox regression

A Cox regression was performed in IBM SPSS 27 according to the methodology proposed by Backhaus et al. (2015) to analyze the CBCA data, which includes observations with censored observations. For the statistical evaluation of conjoint analyses, the uncensored observations correspond to the selected alternatives, as proposed by Wilhelm and Engelmann (2019).

The statistical preference for the level of an attribute is determined by the so-called partworths, which corresponds to the regression coefficient B in the Cox regression (Backhaus et al., 2015). The study objects of interest are initially evaluated holistically, with an overall assessment conducted based on their collective characteristics. Subsequently, analytical techniques in statistics are employed to assess their individual components and the partworths they offer (Backhaus et al., 2015, p. 176). The value of Exp(B) provides information about the ratio of probability and counter-probability with which an alternative with a certain level is selected (Wilhelm & Engelmann, 2019). This is called the odds ratio and is an indicator of the factor by which the probability changes when the predictor is increased by 1 (Field, 2017). A value of Exp(B) greater than 1 indicates that the probability of the expected outcome occurring increases as the predictor increases. Conversely, a value less than 1 indicates that the probability of the outcome occurring decreases as the predictor increases (Field, 2017).

By normalizing the range of regression coefficients of all levels of an attribute, the relative importance of the attribute was also determined (Backhaus et al., 2015). For utility estimation using the underlying logit choice model and applying the maximum likelihood method, all variables (levels) must be dummy-coded (Backhaus et al., 2015). For the dummy coding, the attribute with the lowest level was defined as the base category for all features, i.e., without gamification; JIF = 0.0 and publication costs = €0.

Procedure

The experiment was conducted using a self-developed browser-based web tool. The experiment began with an introductory phase, during which the participants were informed about the various features of the tool and were given the opportunity to familiarize themselves with the selection process. They then completed a pre-study questionnaire, including the privacy policy statement. The questionnaire consists of questions about the discipline in which the subjects work, the number of years they had been engaged in scientific endeavors, and the position they held as a researcher at the time. Additionally, subjects were queried regarding the criteria they would consider when selecting a journal for the publication of their work via free-text responses. Subsequently, the 15 choice sets were displayed to each subject. The three journal publication scenarios, which were presented in a randomized order, could then be rearranged according to the subject's preference. To accomplish this, the three boxes containing the information about the three journals were rearranged from their original position on the left to the desired position on the right (see Fig. 2) via drag and drop. All subjects were

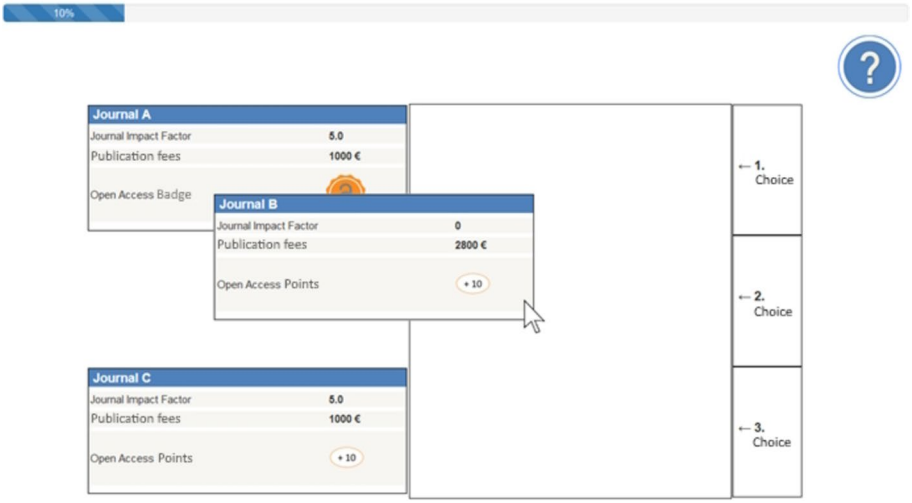

Fig. 2 Example of the drag-and-drop process for the journal publication scenarios in the conjoint experiment

presented with the same 15 choice sets in the same sequence. However, the order in which the three choices were presented to the subjects was randomized, resulting in 15 rankings from 1 to 3 for each subject.

Following the conjoint analysis, a post-study questionnaire was used. Subjects were asked whether they had previously published OA articles in a journal and which game design elements they would most likely consider motivating. As a reminder, before starting the selection process with the 15 choice sets, subjects were asked what criteria they would consider when choosing a journal to publish their work. In the post-study questionnaire, the subjects' responses to the question of what criteria they would consider when selecting a journal were reiterated to facilitate self-reflection. To collect demographic data such as age, gender, and country of origin were collected at the end of the experiment.

Additionally, subjects were afforded the opportunity to provide further commentary regarding the experiment. Figure 3 provides a simplified illustration of the experimental procedure.

Data cleansing

In order to ensure the integrity of the data set, all incomplete data sets were removed in the initial stage of the analysis. This involved the exclusion of all data sets in which not all 15 choice sets had been ranked. As a result, a total of 232 incomplete entries were excluded before the analysis, after which the data set contained 356 evaluable entries (see Fig. 3).

To rule out multiple participation by the subjects, these 356 entries were checked for duplicate session IDs. The data set contained no duplicate values, indicating that all 356 entries could be retained for analysis. In addition, the time stamps that were recorded for each participant at the beginning and end of the experiment were examined. No anomalies, such as clicking through too quickly, were detected here either.

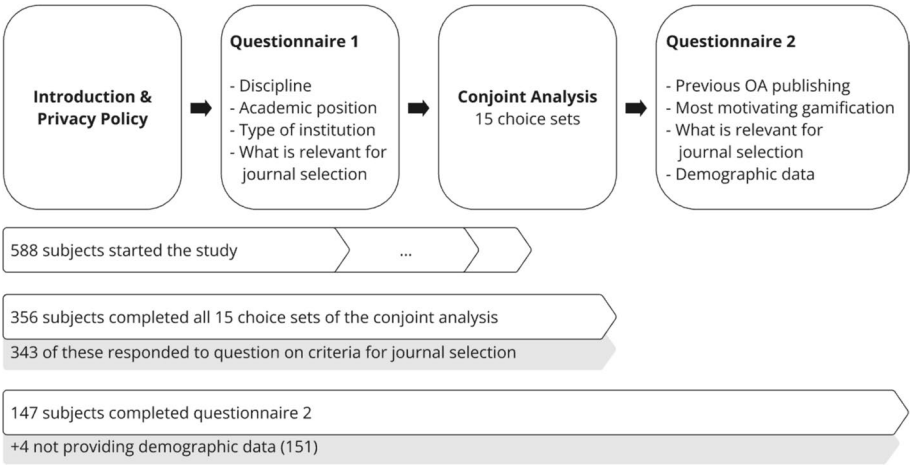

Fig. 3 Overview of the experimental procedure, including the number of subjects in each step

Sample

To assemble the sample, a total of 4000 emails were sent to German-speaking academics, primarily from the field of economics. Of the 4000 emails, 298 were undeliverable. The email addresses were obtained from a mailing list provided by an infrastructure organization with strong links to economic scientists. A total of 588 people started the experiment, 356 of whom completed all 15 sets of the conjoint analysis. The subsequent questionnaire was completed in full by 147 of the subjects (Fig. 3). Of these, 56 (38.1%) identified themselves as female and 91 (61.9%) as male. The mean age was 41.6 years (SD 13.74).

In addition to demographic data, data on academic careers were also analyzed. Tables 2, 3, and 4 summarize the distribution across disciplines of the positions currently held in academia, the academic positions held, and the types of institutions at which they are employed.

The demographic data indicates that most subjects are affiliated with the field of economics, holding positions such as professors, research assistants, and PhD students. Additionally, the majority of subjects are associated with a university.

Table 2 Distribution of subjects according to their self-reported discipline

Discipline	N	In %
Agricultural Sciences	2	.6
Natural Sciences	4	1.1
Humanities	6	1.7
Law	7	2.0
Engineering Sciences	8	2.2
Social Sciences	11	3.1
n/a	51	14.3
Economic Sciences	267	75.0

Table 3 Distribution of subjects according to their self-reported current academic position

Current academic positions	N	In %
Other	4	1.1
Research Assistant	13	3.7
PhD Student	21	5.9
n/a	51	14.3
Postdoc/Senior Researcher	65	18.3
Research Assistant + PhD Student	83	23.3
Professor	119	33.4

Table 4 Distribution of subjects by self-reported type of institution with which they are affiliated

Type of institution	N	In %
Other	1	.3
Public Authority	1	.3
Industry	1	.3
Privately funded research institution	9	2.5
Publicly funded research institution	32	9.0
n/a	51	14.3
University	261	73.3

Results

This chapter presents the findings of the experimental study. The following section presents the results of the CBCA for the first, second, and third choices. The subsequent section presents the qualitative evaluation of the questionnaire.

Results of the CBCA

The following section presents a three-step analysis of the results of the CBCA. Initially, the data from all subjects are examined in relation to the first-choice journal (Choice 1). Subsequently, the second (Choice 2) and third (Choice 3) choices are also analyzed separately.

Choice 1

The goodness of fit of the model for the first choice is tested (Backhaus et al., 2015). The log-likelihood function provides the value 4203.2, and the likelihood ratio test yields (X^2 (9, $N = 16020$) = 6204.3, $p < 0.001$). Therefore, the estimated model is statistically significant and contributes to explaining the selection decisions of the journals presented by the researchers.

The regression coefficient B represents the part-worth per level. The p-value indicates the statistical significance of the regression coefficient in predicting the model. For the first choice, all regression coefficients are statistically significant except for

Table 5 Results of the Cox regression for the first choice (Choice 1)

Levels	B	Standard error	*p*-value	Exp(B)
Gamification				
OA-Level on Profile	.326	.170	.055	1.385
OA-Badge on Profile	1.102	.100	.000	3.011
OA-Points on Profile	.182	.098	.062	1.200
OA-Badge on Article	1.251	.142	.000	3.494
Journal Impact Factor				
JIF 5.0	2.748	.127	.000	15.606
JIF 30.0	5.312	.146	.000	202.704
Publication fees				
€1000	– .550	.134	.000	.577
€2000	– 2.209	.147	.000	.110
€2800	– 2.704	.147	.000	.067

"Level on profile" and "Points on profile," with statistical significance just missed, as seen in Table 5.

The highest regression coefficient and, therefore, the greatest partial benefit was achieved by the JIF of 30.0 with 5.312, followed by the JIF of 5.0, with 2.748. The four characteristics of the gamification feature also possess a positive regression coefficient. This means that the game design elements also increase the probability of selecting a journal by the researchers. In contrast, all three levels of publication fees have a negative part-worth and would, therefore, lead to a reduced probability of selection.

According to the regression coefficients, the odds ratio is highest for both levels of the JIF attribute. The results show that the probability of a journal being preferred over the others was more than 202 times higher when it had a JIF of 30.0 than when it did not. With a JIF of 5.0, the probability was still more than 15 times higher than for a journal with a JIF of 0.0. The two statistically significant levels of gamification, badge on profile and badge on article, each contributed to a more than three times higher probability of a journal being selected first. For the publication fee attribute, all three levels have an Exp(B) value less than 1. For a fee of €1000, the probability of a journal being selected is 1.7 times lower. At a fee of €2000, the probability is already nine times lower, and at a fee of €2800, it is almost 15 times lower. The relative importance of all three attributes is summarized in Fig. 4.

To determine the relative importance of the three attributes, the range between the part-worths of all levels of an attribute is determined. For each attribute, this range is then subtracted from the sum of the ranges of all three attributes, whereby the baselines all have a value of 0.00. This results in the following calculation for attribute JIF: range JIF (5.312 – 0.00) / (range gamification (1.251 – 0.00) + range JIF (5.312 – 0.00) + range publication fees (2.704 – 0.00)) = 0.573.

As can be seen, the *JIF* attribute is the most important for the subjects' first choice, with 57.3%. This can probably be attributed to the very high JIF value of 30.0. This is followed by *publication fees* with 29.2%. As can be seen from Exp(B), this high relative importance has a negative influence. The influence of the attribute publication fees leads to the non-selection of a journal but has the second strongest influence of the three investigated attributes on the subjects' first choice. In relative terms, *gamification* has the least influence, at 13.5%.

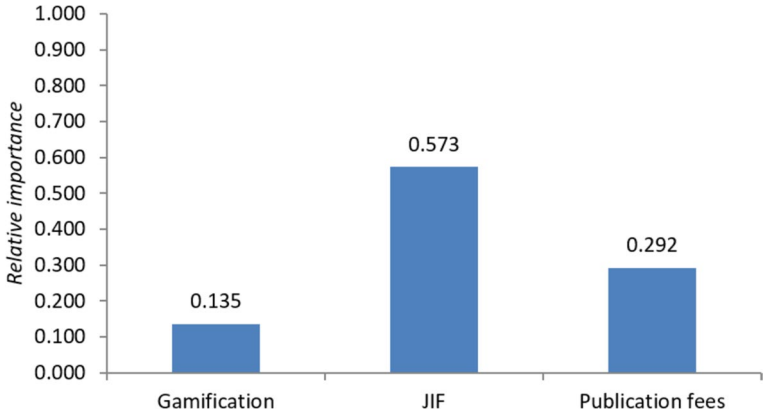

Fig. 4 Relative importance of Choice 1

Choice 2

The log-likelihood function achieves the value 10,099.4, and the likelihood ratio test yields (X^2 (9, $N = 16020$) = 1513.4, $p < 0.001$). Thus, the estimated model is also highly statistically significant for the second choice.

All p-values in Table 6 are statistically significant, confirming the model's prediction by the regression coefficients. The highest part-worth is obtained for the second choice by the badge on the article, closely followed by the level on the profile. The part-worth of both characteristics of the JIF attribute is significantly lower here than for the first choice. However, this is not surprising, as it can be assumed that journals with a high JIF have already been selected for the first choice and are no longer available for the second choice.

The odds ratio is also relatively high for the second choice of game design elements. For example, a badge on the article makes it 4.7 times more likely that a journal will be chosen than one without a badge. Levels on the profile page also lead to a four times higher probability of a journal being selected by researchers.

Table 6 Results of the Cox regression for the second choice (Choice 2)

Level	B	Standard error	*p*-value	Exp(B)
Gamification				
OA-Level on Profile	1.425	.080	.000	4.157
OA-Badge on Profile	.569	.059	.000	1.767
OA-Points on Profile	1.195	.058	.000	3.302
OA-Badge on Article	1.556	.073	.000	4.738
Journal Impact Factor				
JIF 5.0	.670	.041	.000	1.954
JIF 30.0	– .482	.058	.000	.618
Publication fees				
€1000	– 1.294	.084	.000	.274
€2000	– .306	.073	.000	.736
€2800	– .959	.085	.000	.383

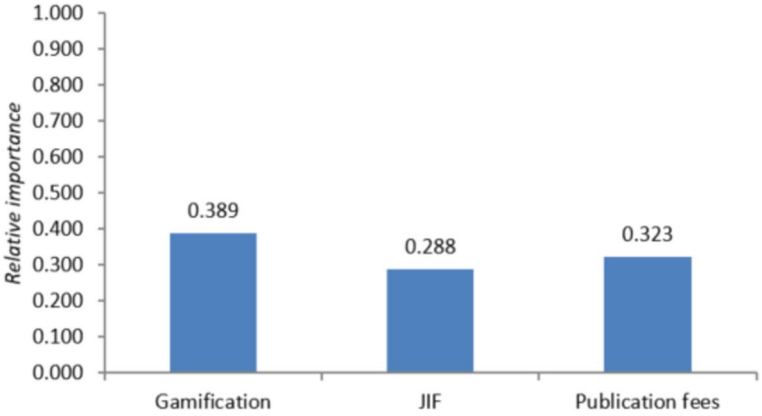

Fig. 5 Relative importance of Choice 2

Table 7 Proportions which gamification option subjects in the experiment prefer (N = 151)

Game Design Elements	N	%
None	32	21.2
OA-Level on Profile	15	9.9
OA-Badge on Profile	35	23.2
OA-Points on Profile	10	6.6
OA-Badge on Article	59	39.1

The second choice is the most dependent on gamification at 38.9%, followed by publication fees at 32.3% (Fig. 5). Compared to the first choice, however, the relationship between the three attributes is much more balanced.

Choice 3

The third choice is also evaluated for the sake of completeness. This corresponds to the least preferred journals across all selection decisions. Usually, the last choice is not reported (Eggers et al., 2022, p. 797); hence, the results are only briefly discussed here.

As can be seen in Table 7, only the three levels of publication fees in the third choice deliver a positive partial benefit. Nevertheless, the relative importance of the JIF attribute is also greatest here, as can be seen in Fig. 6.

The third choice of the researchers favors again the JIF with 45.2% having the publication fee's relative importance at 34.7%. This result mirrors the results of the first choice negatively, as a researcher would never decide to put a journal with high JIF as the last choice.

Qualitative results

In addition to the selection decisions, various additional information was collected from the subjects by means of a questionnaire. When asked if they had ever published an OA

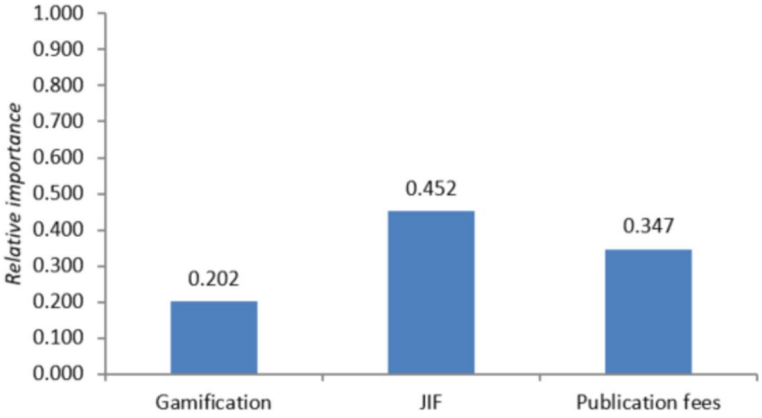

Fig. 6 Relative importance of Choice 3

article in a journal, 151 of the participants (42.4%) responded. Of these, 52 answered yes (34.4%) and 99 answered no (65.6%).

The responses to the question of which of the game design elements presented in the conjoint experiment are most likely to motivate subjects to choose a journal are summarized in Table 8. This question was also answered by a total of 151 of the subjects.

According to the participants' own assessment, about 39% would say that a badge on the article would be the most motivating for them. This is consistent with the results of the CBCA. In both the first and second choices, the badge on the article achieved the greatest part-worth compared to the other levels of the gamification attribute.

In addition, the criteria that the subjects considered relevant to their choice of journal were analyzed. To this end, subjects were first asked, before completing the CBCA, what criteria they would consider when selecting a journal to publish their research. We received a total of 343 free-text responses to this question. Most of them mention some kind of ranking as an important criterion for selecting a journal:

Respondent ID 535: *"Fit of the topics of the article & the journal; VHB Ranking;*

Table 8 Results of the Cox regression for the third choice (Choice 3)

Level	B	Standard error	*p*-value	Exp(B)
Gamification				
OA-Level on Profile	– 1.454	.114	.000	.234
OA-Badge on Profile	– 1.167	.076	.000	.311
OA-Points on Profile	– 1.122	.081	.000	.326
OA-Badge on Article	– 2.090	.119	.000	.124
Journal Impact Factor				
JIF 5.0	– 2.740	.090	.000	.054
JIF 30.0	– 4.684	.126	.000	.007
Publication fees				
€1000	1.671	.163	.000	5.320
€2000	2.347	.149	.000	10.454
€2800	3.594	.170	.000	36.392

Impact Factor; Experience of colleagues with the journal; Information on turnaround times (if available); Special fit of a special issue, if applicable."
Respondent ID 56: *"If the paper has high potential, I would first submit it to a top 5 journal or top field journal. If it doesn't have that much potential, then I would go after the Handelsblatt ranking or a journal that I know has already published this type of research."*

Nevertheless, it was not always the case that high-ranking journals were automatically regarded as the optimal venues for publication. Indeed, they were also considered a potential pitfall to be avoided:

Respondent ID 280: *"Not too high-ranking, because as a lecturer at a University of Applied Sciences I have little time for real research and cannot compete with university researchers."*

Additionally, softer criteria, such as the peer review process or the journal's readership, were identified as relevant considerations. Two illustrative examples are provided below:

Respondent ID 629: *"Peer review; broad readership + circulation; good reputation in the scientific community; frequent citation"*
Respondent ID 534: *"Copyright; Drafting contracts for authors; Clear scheduling; Formal requirements with simple implementation for professors who do not have assistants to take care of format issues."*

Two of the authors and two independent individuals were responsible for classifying each comment from the subjects. Following several iterations with discussion and agreement, the responses from the researchers were grouped into seven categories, which were constructed ad hoc:

Ranking: Comments that either directly mention the term ranking or refer to such a ranking (e.g., JIF, VHB ranking, Handelsblatt ranking, SSCI, h-Index, VfS journal list) were included. Also, some comments used terms such as, e.g., metrics, CiteScore, degree of evaluation, impact, and publication/impact category/level A, B, and C.
Thematic/Methodological Fit: This category includes all comments that mentioned either the journal's thematic and/or methodological fit. This includes, e.g., content or subject fit/relevance/orientation/focus, journal focus, subject area, field, scope, fit, orientation, relevant to the topic, and direct mention of a topic area the respondent would look for when searching (e.g., environment and sustainability).
Reputation: This category includes all comments that either directly mention the term "reputation" or refer in some way to the reputation of a journal without referring to any kind of ranking. Terms and comments assigned to this group include, e.g., quality of authors/contributions, reputation/importance in discipline/field, relevance and visibility, community standing, notoriety, familiarity among colleagues, prestige, good experience, experience/opinion of colleagues, scientists from own network publish there, articles I cite have appeared there, relevance, distribution, visibility, renown, scientific standard, high standard; reputable, fits university strategy, and editor/publisher.
Review Process: All comments related to the journal's review process are included in this category. In addition to directly mentioning review as a criterion, comments in this category include, e.g., double-blind review process, peer review experience, publication process, peer review, publication timing, turnaround time, time and cost of review process, likelihood/chance of acceptance, likelihood of publication, fit, fairness of review/

review process, success of submission, organization/dealing with authors and submissions, editorial board, submission & review process, and experience with reviewers.
Target Group: This term summarizes all articles that address a journal's readership, reach, or target audience.
Open Access: This category includes all comments that either directly mention the term OA or mention OA as a criterion.
Other: All other criteria that are not mentioned more than ten times by the four classifying individuals. These include publication costs, internationality, and the practical orientation of the journal.

Figure 7 illustrates the distribution of the number of responses assigned to one of the seven categories. It should be noted that subjects were permitted to state more than one comment and that comments could also be classified into more than one category.

The data indicate that most subjects (66%) identified ranking as the primary factor influencing their journal selection. It is, therefore, not surprising that more than one-third of the classified comments fall into this category.

Discussion

The advantages of publishing scientific papers OA are manifold (Huang et al., 2024; Piwowar et al., 2018); nevertheless, traditional forms of publication remain the preferred option for many reasons. This study analyzes the impact of gamification for promoting OA journal publishing compared to traditional subscription-based publishing models. The decision-making process of 356 researchers' publishing behavior is analyzed with a CBCA and complemented with qualitative survey data. The statistical results show that out of the three investigated attributes, namely JIF, gamification, and publication fee, the JIF has by far the most substantial impact on the journal publishing decision-making process of

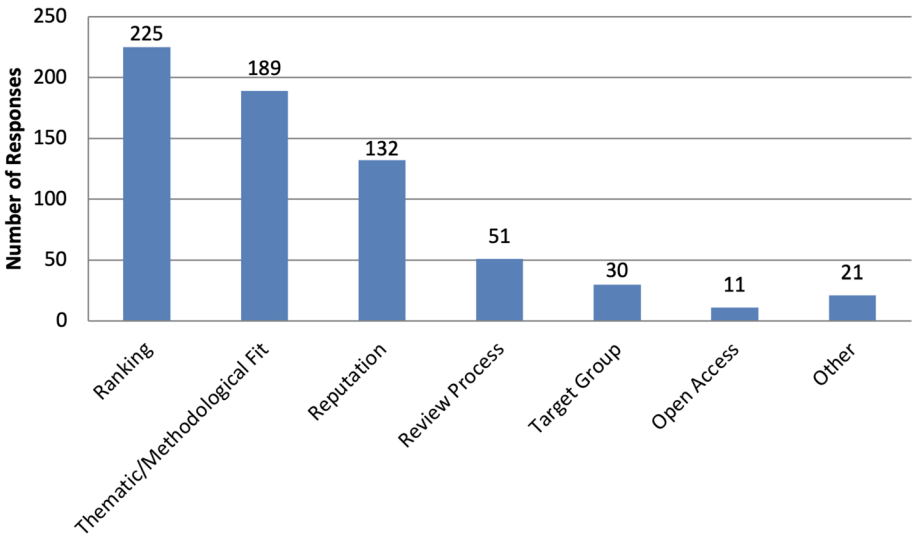

Fig. 7 The number of responsesassigned to each of the seven classified categories

researchers. Nevertheless, although this outcome is not particularly unexpected, the results show that gamification can be a significant factor in this process, as it provides visibility and reputation and may serve as an alternative for researchers, at least from a second-look perspective. In contrast to previous work (Rowley et al., 2022), this study employs a methodology that extends beyond the use of a questionnaire. Instead, it incorporates an experimental setting utilizing a CBCA to derive meaningful conclusions.

Having a closer look at the three different choices, the most important for Choice 1 is the JIF, with 57.3%, followed by publication fees (29.2% with negative influence), and gamification (13.5%). Although gamification scores the last rank in Choice 1 in relative importance, all four gamification levels possess an increasing selection probability. Furthermore, gamification is the dominant criterion within Choice 2, followed by publication fees. In contrast, the JIF is less relevant within the second choice and most relevant again – in a negative way – in choice 3, which constitutes the least preferred journal scenario. For choice 3, this means that a researcher would be least likely to put the JIF on the last rank as the JIF would be too important for the publication choice. These results align with those of other studies, which similarly highlight the significance of metrics such as the JIF as a key indicator in publication decisions (Lemke et al., 2021).

Even though the JIF is of the highest importance in a researcher's journal publishing decision in this study, the results emphasize gamification as a promising incentive for OA publishing. In particular, badges on an article can affect the journal selection, as the CBCA and the subsequent survey reveal. This is also interesting, considering the majority (65.6%) of surveyed participants ($N = 151$) stated that they have never published an OA article in a journal.

The data reveal a clear preference for the option that incorporates a badge displayed directly on the article in both Choice 1 and Choice 2. This option consistently ranked as the most popular among the four gamification variants. In contrast, the three alternatives, where gamification features were displayed on a researcher's profile page, were slightly less favored. The responses regarding gamification preferences align with the findings of the conjoint analysis, confirming that the badge displayed on the article is the most motivating element for participants. As 39.1% of respondents indicated, this option was preferred over alternatives like badges or points displayed on a research profile. One possible explanation for this result could be that it is easier for participants to envision how a badge might appear on an article they have authored, as opposed to imagining how gamification features would be integrated into a profile on an academic platform. This is particularly relevant for individuals who may not currently use or have experience with such platforms. The lack of familiarity with academic profiles or the visualization of these features may have influenced their preferences, highlighting the importance of clear and tangible incentives in motivating researchers to use academic profiles on specific platforms.

In addition, gamification could facilitate competition, which might be favorable or undesirable in different settings. Though competition in science has been discussed since a long time ago and may be either beneficial or detrimental, depending on the circumstances (Hagstrom, 1974), some research strongly suggests using as little competition as possible due to the supposedly negative aspects of competition associated with science (Bauwens et al., 2023). Competition might also drive research excellence, and it is a reality in research assessment worldwide (Winnacker, 2008). However, the negative aspects of competitive gamification have already been acknowledged and need to be considered (Mazarakis, 2021).

In general, the findings support the argument that the JIF is a significant factor influencing researchers' decisions regarding journal selection. In contrast, publication fees are

not a major consideration. This is potentially also related to the fact that all participating researchers come from the global north, where institutional agreements and policies support author-based publishing models. Nevertheless, gamification implementation can be an effective strategy for cost-effectively promoting OA publishing. However, by integrating gamification, for example, as some sort of visibility support tool (Jaime et al., 2021), in the OA ecosystem, critique and existing global inequalities (Pinfield, 2024; Ràfols & Bezuidenhout, 2024) have to be taken into account. A gamification implementation must not reinforce the existing participatory and knowledge barriers for researchers in low- and middle-income countries, nor should it further favor Western European and North American systems. This is particularly important because OA is focused on conventional publishing channels like journals or books from established publishers, which expands the dominance of the Global North over the Global South (Pinfield, 2024). Instead, our approach would prioritize in general visibility and reputation within the context of OA, thereby providing assistance and encouragement to active OA authors while fostering a more positive attitude towards publishing in the OA domain. To illustrate, OA badges could be classified according to three distinct value perspectives: scientific, social, and economic. This classification would allow for the differentiation of OA badges based on their intrinsic and extrinsic values to the authors. This is yet another new area of research that needs to be further explored.

Limitations

This section outlines some of the limitations of the study. As with any experimental study, it is not always feasible or possible to model all potentially relevant decision-making factors. As underscored by numerous participants, one notable aspect is the thematic alignment of a journal with the researcher's work. In this study, it was assumed that all journals presented as options were thematically suitable for the participants, which may not reflect real-world conditions where this factor plays a decisive role. In addition, the decisions made by the participants are hypothetical and based on an artificial scenario. Although there are no indications to suggest otherwise, some participants may be influenced by a social desirability bias, whereby they may feel compelled to respond in a manner perceived as socially acceptable.

A further limitation concerns how the sample was constituted. The subjects were primarily drawn from the field of economics, where the norms and practices of academic publishing may differ significantly from those observed in other academic disciplines. Consequently, the results cannot be generalized across all academic fields (Demeter et al., 2021; Severin et al., 2020).

Moreover, the study exclusively encompassed researchers from German-speaking countries. It is necessary to recognize that there are considerable discrepancies in publication practices across diverse countries. Additionally, it is noteworthy that the proportion of OA journals is relatively low in Western European countries, particularly in comparison to other regions (Demeter et al., 2021). Consequently, the findings of this study are not readily applicable to broader international contexts because they rely primarily on German-speaking economic researchers.

A noteworthy limitation of the study is the absence of consideration of the acceptance or rejection rates of the hypothetical journals. A high JIF may be associated with a low acceptance rate, respectively, a high rejection rate. A high rejection rate might be more

important for researchers to not publish in such a journal. As the study did not consider this variable, the external validity of the study is constrained.

It could be argued that OA badges are ineffective because the open-lock symbol is already a prominent feature. Additionally, it could be argued that the experiment was unsuccessful due to the lack of distinction between the OA badge utilized in the study and the open-lock symbol, which may have resulted in a lack of differentiation between the two. However, the results show that the opposite is the case, as the participants preferred the OA badges in the study. Regardless of the prominence of the open-lock symbol, the study's findings indicate that participants view the OA badges as a compelling motivation to publish OA when an OA badge is awarded. However, there is a potential for erroneous perceptions to emerge, such as "openwashing," which could be perceived as a deceptive practice. This could be confused with related concepts, symbols, and language (Costello, 2019). An additional questionnaire would be essential to evaluate the conceptual understanding of the participants to address this.

Finally, the attributes and levels used in the conjoint experiment could be a potential limitation. The publication fees may be less objectionable (Morrison et al., 2021), whereas the gamification levels consist of only a few of the possible game design elements (Voit et al., 2020) and stick to the most frequently examined game design elements in the context of gamification research (Koivisto & Hamari, 2019; Mekler et al., 2017). However, things may be different for the JIF. We used the values provided by Lemke et al. (2021); future research might consider using an additional JIF of 10 to provide more variability.

Outlook

The findings of the study offer numerous avenues for future research. Primarily, the gamification approaches examined in this article were concerned with the individual experience of success. This would also indicate that a change in the publication landscape, including the individual researchers but also the research community as a whole, is necessary (Robson et al., 2021). Gamification may also be utilized to cultivate a community of researchers who provide mutual support and encouragement. Incorporating community-oriented challenges or collaborative game design elements could facilitate the formation of a sense of belonging and a unified objective to accelerate the transition to OA publishing. Moreover, such a community could also serve as a platform for knowledge dissemination and awareness raising regarding the advantages of OA publishing. Future research should focus on investigating the conditions for this realization.

The application of gamification in academic publishing, as explored in this study, offers promising potential beyond the realm of OA journals. Gamification principles could be extended to various other areas of OS, such as open data, open peer review, open educational resources, and citizen science. To illustrate, the open data community, like OA in its early stages, is still evolving and faces challenges related to the availability and accessibility of research data (Stirling, 2024). Gamification has the potential to serve as an effective tool to motivate researchers to share their data more openly by rewarding contributions to open data repositories or tracking progress toward more transparent research practices. This represents a promising field for further research activities.

Moreover, gamification has the potential to be utilized to advance specific categories of OA, such as Diamond OA, which is free for both authors and readers, in contrast to APC-based OA or subscription-based models. In the context of ensuring equitable access to scientific knowledge, the growing importance of Diamond OA cannot be overlooked. By

incorporating gamified incentives to promote this model, the OA ecosystem could become more inclusive, addressing barriers to access and publication that currently persist in APC-based systems.

A further significant avenue for future research would be a shift in focus toward investigating the factors that influence researchers during the process of writing their articles, as opposed to merely selecting a journal for publication (Rowley et al., 2022). A potential follow-up study could use a CBCA to assess which criteria are most relevant when researchers cite other work. Attributes such as year of publication, number of citations, availability of a freely accessible PDF, and the gamification options explored in this study could be included. This approach would provide valuable insights into how gamification could influence decision-making processes in the creation and dissemination of scientific work, potentially shaping the landscape of scientific writing and referencing.

Ultimately, the findings indicate that gamification can potentially motivate OA publishing. However, publishers could use this to implement comparable gamified incentives that may not align with the principles of equitable access or the objectives of OS. Nonetheless, at the same time, academic publishers could also leverage the positive aspects of gamification to shift away from the JIF as the sole factor for selecting a journal for publication and provide a more diverse research assessment. This presents a double-edged sword, and future research must determine how to avoid the negative impact and facilitate the positive for the common good of science and research. It is evident that this could be of interest to academic publishers. While preliminary inquiries have been made (Köbli et al., 2024), they are not yet at the level of detail investigated in this study. Consequently, neither the positive nor the negative aspects have been assessed sufficiently. Nevertheless, the results of this article will be of interest to publishers, and we anticipate that the results will be subjected to further analysis and potentially incorporated into future practices.

Conclusion

This article aims to provide the first insights into the concept of gamification as a new feature to incentivize researchers to publish OA and thus broaden the scientific landscape. Furthermore, the article answers the research question of the impact of gamification on researchers' decision-making processes when selecting between OA and traditional subscription-based journals. By applying game design elements to a fictional academic publishing process, this study, based on a CBCA experiment and additional qualitative data from a questionnaire, explores how badges, points, and levels might encourage researchers to choose OA over traditional subscription-based journals. The results from both the conjoint analysis and the follow-up qualitative data collection reveal a clear preference for visible rewards, such as a badge displayed on the article, which was consistently the most motivating option for subjects. This suggests that tangible, article-specific incentives may hold promise in shifting researchers' publication behaviors towards OA, particularly when integrated into existing academic reward structures. However, the study also highlights the ongoing dominance of traditional prestige metrics, such as journal rankings and impact factors, which continue to play a crucial role in researchers' decision-making processes. While gamification has the potential to complement these metrics, it is unlikely to replace them. Instead, its value may lie in providing additional motivation when researchers are choosing between similarly ranked or reputable journals, particularly in contexts where visibility and accessibility are becoming increasingly important. Furthermore, the

qualitative data underscore the diversity of criteria that researchers consider when selecting a journal, including thematic fit, peer review processes, and audience reach. This suggests that any gamification strategy must be carefully tailored to fit within the broader context of academic publishing, addressing not only the need for recognition but also the practical concerns of researchers across different disciplines. This research is important in terms of the demonstration that there are alternatives to the selection criteria that are in place, such as the JIF.

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Declarations

Conflict of interest The authors of this article are or have been affiliated with Isabella Peters, a member of the editorial board of *Scientometrics*. Isabella Peters did not contribute to this article, nor did she make any significant contribution.

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