How Organisers Understand and Promote Participants' Creativity in Game Jams

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ABSTRACT

Game jams are fast-paced game-making events that aim to elicit the participants' creativity; a quality often ascribed to game jams. However, there is only little research on creativity in game jam formats. Since game jam organisers have great influence on how creativity can be supported in game jams, we explore creativity from the organisers' perspective. We report insights from an online survey with responses from 27 game jam organisers from 12 different countries with dissimilar levels of organiser experience. We analyse the organisers' understanding of creativity based on four key aspects from general creativity research: novelty, risk-taking, combinational creativity and creativity constraints. These key aspects guide a deductive, thematic analysis to explore how game jam organisers not only understand, but indeed try to promote the participants' creativity. On this basis, we discuss how insights from creativity research may further contribute to inform how organisers can successfully facilitate participants' creativity in game jams.

CCS CONCEPTS

• **Human-centered computing → Interaction design process and methods**.

KEYWORDS

Game jam, organiser, creativity, accelerated design process, innovation

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1 INTRODUCTION

In recent years, game jams have turned out to play important and diverse roles for individuals, who take part in these various game-making events. Game jams can be described as: "[...] accelerated opportunistic game creation event[s] where a game is created in a relatively short time frame exploring given design constraint(s) and end results are shared publically." [39]. Often inspired by a theme presented at the beginning, participants generate game ideas, design, play-test and prototype digital or analogue games. A design process in a game jam format is thus highly accelerated, since the entire creative design process is typically completed within 48 hours. The time frame, however, is flexible, and game jams can vary in terms of duration. The time constraint is intended to create pressure and thereby encourage creative and fast decision making [39]. The formats have been known for prompting an experimental, innovative, fun, creative and collaborative environment, which is widely valued and have become important stepping stones for future game makers [39, 64]. Game companies have even embraced game jam formats as "[...] internal creativity boosts" [42]. Although game jams are commended by researchers [39] and game jam organisers [32] for prompting a rich and distinctive creative environment, and despite a growing body of research on game jams in general, there are but a few studies on the relationship between the formats and creativity, with some notable exceptions being [14, 28, 29, 41, 51]. Furthermore, except from [36, 40], very little research has been conducted from the game jam organisers' perspective.

We argue that studying creativity from the perspective of the organisers is important, as they are usually in a position where they can greatly affect the setup of the game jam event and facilitate the game jam participants' creativity [40]. How key creativity concepts are understood will often vary. As a case in point, Jones, Rodgers and Nicholl [34] found that even design tutors in higher education find it difficult to clearly conceptualise creativity although they stress that it is vital to cultivate and support, for instance in collaborative innovation-oriented activities. Informed by their work, we wish to explore how game jam organisers themselves understand the concept of creativity and how they aim to facilitate it in

the jams. In order to do this, we conducted a survey study of 27 game jam organisers with varying levels of experience and different backgrounds.

We analysed the responses using deductive thematic analysis in which four key aspects from creativity research guided our analysis: novelty, risk-taking, combinational creativity and creativity constraints. Here, novelty is framed as an overarching goal for creativity in game jams, whereas the other three aspects are seen as mechanisms for achieving this goal. The contribution of the paper is a theoretically grounded analysis and discussion of the organisers' understanding of creativity and their efforts to promote participants' creativity in the light of these four aspects. Informed by this analysis, we discuss how game jam organisers may further strengthen the organisation of game jams based on creativity research as a means to support participants' creativity.

2 CREATIVITY RESEARCH

Before we turn toward the organisers'own understanding of creativity in game jams, we outline and motivate our choice of the four key aspects of creativity research.

2.1 Current Creativity Research at a Glance

Firmly rooted in psychology, creativity research has since the modern-day beginning of this discipline [23] evolved through a number of waves [60]. The first wave was characterised by a focus on personality, exceptionally gifted individuals and psychometrics. The second wave signalled an increased interest in the underlying processes of creativity across different domains. This spawned a third wave of creativity research up through the 1980's, where sociocultural themes and interdisciplinary approaches took priority, often conceived through studies of teams or even entire organisations in order to investigate how creativity occurs and can be stimulated through various types of interventions [60]. Recently, researchers in the HCI community [17] have pointed to the emergence of a new and even broader wave of the growing digitisation of creative practices, materials and tools. Our work is informed by the sociocultural and team-oriented focus of the third wave, not least how creativity can be stimulated, as well as the emerging research interest in how creativity appears in the flourishing domain of digital creativity to which we ascribe game jams.

2.2 Identifying Four Key Aspects of Creativity

Although most scholars agree that creativity regardless of domain must at least include the hallmark descriptors of "novel" and "useful", as part of the standard definition of creativity [58], a more nuanced understanding of creativity is contested. We subscribe to the definition by Plucker, Beghetto, and Dow [55], according to whom creativity is: "the interaction among *aptitude*, *process*, *and environment* by which an individual or group produces a *perceptible product* that is both *novel* and *useful* as defined within a *social context*" (orig. emphasis). In order to explore how organisers understand and promote creativity in game jams, the first aspect to explore is therefore *novelty*.

2.2.1 Novelty. Innovation research has found that at least eighty percent of new products are incremental in scope. They are small improvements on existing designs [21]. This shows that from a user perspective, sheer novelty is not necessarily always desirable [6]. Indeed, users seem to choose "novel designs as long as the novelty does not affect typicality" [26]. Still, the importance of novelty is irrefutable despite what has aptly been called a novelty bias [20] in creativity research. Since the usefulness of any creative product is also critical, the challenge is how to achieve a balance between novelty and usefulness, or what Jon Kolko called "valuable newness" [37]. Novelty serves as our first key aspect of creativity and as the overarching *goal* for creativity in game jams, since these events focus on generating interesting new game concepts in which usefulness in terms of immediate business product potential (e.g. direct implementation readiness) are not prioritised as highly. We understand novelty as: "[…] a measure of how unusual or unexpected an idea is as compared to other ideas" [37]. With novelty established as an overarching goal for game jam organisers to strive for in order to promote participants' creativity, the question arises how best to do this based on concrete initiatives. In other words, which further aspects of creativity might be most relevant for organisers to focus on when organising a game jam?

2.2.2 Risk-Taking. Novelty is closely related to the individual experience of surprise and unexpectedness. This makes it relevant to also consider how individuals engaged in a creative process can attain novelty and create the element of surprise and excitement in the user experience. Creativity research has found that open-mindedness, tolerance for ambiguity and intellectual risk-taking are critical for cultivating a creative mindset [25, 56]. For a game jam organiser the aim is therefore to encourage participants to embrace what Beghetto [27] called "beautiful risks." We therefore see risk-taking as our second key aspect of creativity. Many models of creative processes have been offered (for an overview, see [60]). We build on the work of Biskjaer, Halskov, and Dalsgaard [48], who offered a non-exhaustive, componential framework of nine key components of creativity methods in design based on an extensive interpretative literature review. In our interpretation of Biskjaer et al.'s analytical framework, *combinational creativity* and *creativity constraints* are particularly relevant for generating novel game design concepts in a game jam. Indeed, we interpret these two and risk-taking (above) as three critical *mechanisms* of creativity in game jams.

2.2.3 Combinational Creativity. Combinational creativity is vital in creativity [8]. It refers to the act by which one tries to: "discover new and potentially useful emergent properties; that is, properties not commonly seen in the individual component concepts, but that emerge only in combinations" [62]. The generation of novelty is then based on: "unfamiliar combinations of familiar ideas" [8]. In order to avoid the peril of design fixation [66], being able to engage in divergent thinking is crucial in combinational creativity, because it "allows one to explore in different directions from the initial problem state, in order to discover many possible ideas and idea combinations that may serve as solutions" [15]. The goal of such creative initiatives is to gather inspiration [52] in order to explore the limits of, and ideally to transcend, the immediate design space of a given creative situation or task. Our third key aspect, combinational creativity, is therefore closely related to the fourth key creativity mechanism.

2.2.4 Creativity Constraints. Since a design space can be conceived as comprised of constraints [5], constraints are very important in a

creative process such as a game jam. Although one would think that constraints only delimit creativity, "constraints on thinking do not merely constrain, but also make certain thoughts–certain mental structures–possible" [8]. This important dual role of constraints in creativity is well-established, e.g. [35, 46, 49, 53]. The effect of time constraints on creativity has attracted some attention, (e.g. [7, 13, 47]); however, most studies have investigated small-scale time spans such as minutes or a few hours. Studies into the pressure from time constraints experienced over hour-long sessions or even one-two full days are limited.

3 CREATIVITY IN GAME JAMS

Only few researchers have studied the role of creativity in relation to game jams. One exception is Kultima and Alha [41], who concluded that an ideation tool tailored for a specific purpose and structured for the fast pace of a game jam might improve ideation. Related to this contribution, Ho, Tomitsch, and Bednarz [29] conducted a pilot survey study on participants' ideation practices. Continuing the line of research on ideation in game jams, Ho [28] surveyed ideation tool kits and encouraged research of ideation tool kits in game jams, arguing that game jam participants cannot rely on serendipity when generating ideas within a short time frame. Based on Lawson's work [44], Kultima, Alha and Nummenmaa [43] studied how game jam participants conceptualise and describe the role of design constraints. Sharing an interest in game jams as constrained formats, Falk Olesen and Halskov [51] identified and discussed specific creativity constraints that influenced and drove the design process during a game jam. In the present paper, we take a broader stance to creative processes by applying key aspects of creativity in general; however, our findings likewise point to the importance of constraints in the creative design process. As for an organiser's perspective on game jams, Fowler et al. [16] took a high-level stance on game jam organisation by focusing on organising philosophy. They contributed with different categorisations of game jam organising philosophies. Eberhardt [14] offered reflections on the organisational philosophy of game jams run at MIT, noting trends moving from learning opportunities for participants to game jams as sources of innovation and inspiration for sponsors. A couple of more recent studies include a study on game jam organisers' design values [40] and a study on game jam organisers' motivations and experiences [36]. The former was a pilot study on cultural intermediaries between organisers, while the latter paper found six different motivations for organising game jams. Related to our research question, one of these organiser motivations concerned the nourishing and support of a creative culture through game jams. However, to the best of our knowledge, there are no studies on how creativity in relation to game jams is understood, let alone scaffolded through interventions, specifically from an organiser's perspective. In the following study, we explore this gap in the current body of research.

4 METHOD

The data for our study was collected through an online survey. The survey responses were analysed through deductive thematic analysis.

4.1 Survey Design

The online survey was conducted in the spring of 2019. Since the authors are familiar with the game jamming community, the online survey was distributed via the authors' network. In the survey, we emphasised our interest in how the organisers understand creativity in relation to game jams, how they organise the formats in general and, in particular, how they support creativity. The survey covered: 1) Demographic background; 2) Organiser experience; 3) Five-point Likert-scale statements on motivations and values (see Table 1) and an open-ended question about creativity: "What does creativity mean to you in relation to game jams?"; 4) A self-chosen "successful" game jam organised by the respondent; 5) Description of the pre-development phase of the self-chosen game jam; and 6) A description of the development phase of the self-chosen game jam. We did not prompt the organisers toward the four key creativity aspects, because we were interested in exploring the organisers' own understanding of creativity in game jams. Based on our experience with game jams, we further distinguish between two phases in a game jam: The *pre-development phase* is right after the revelation of a theme and thus before participants start creating the games. The *development phase* is when participants have formed groups and have transitioned into developing a game. Often, the pre-development phase transitions into the development phase when for example a group has decided on a direction for one game idea that they want to develop. Here, we zoom in on the responses to whether the organisers facilitated creativity during the pre-development and development phase, and if so, how they did it. We asked the organisers to focus on what they considered *their most successful game jam* for two reasons. Firstly, we hypothesised that by focusing on one jam, the organisers could focus on the details of the organising for that particular game jam without resorting to generalisations in order to cover all of their game jams. Secondly, an organiser's way of organising game jams might differ over time, as they get experience with the organiser role. We hypothesised that by letting the organisers focus on a successful game jam, we would obtain answers that would most likely reflect this accumulation of organiser experience and thereby offer insight into best practices.

4.2 Deductive Thematic Analysis

We conducted a thematic analysis of the survey results in order to identify organisers' understanding of creativity and their initiatives to promote it. Thematic analysis is a useful approach for "systematically identifying, organising, and offering insight into patterns of meanings across a data set" [9]. The thematic analysis proceeded according to Braun and Clarke's approach [9]. The first author explored the survey responses in order to establish familiarity and highlight items of interest; then, an initial coding was conducted on the data and cross-checked with the co-authors. During the process of analysis, we cross-checked the coding of the data with the four key aspects from creativity research. Thematic analysis can be approached inductively or deductively; however, often coding and analysis deploy both approaches [9]. Our predominantly deductive analysis approach was a consequence of our interest in how the organisers' understanding of creativity in game jams reflected the discerned key aspects of creativity with a particular relevance for game jams as a unique type of time-constrained, interdisciplinary creativity format. In practice, this meant that we were aware of

our research interest in the four key creativity aspects during the analysis of the organisers' understanding of creativity. Given the brevity of most responses, a deductive approach was furthermore useful for comparing and analysing the responses in relation to the four key creativity aspects.

5 ORGANISERS' BACKGROUND, VALUES, AND GENERAL ORGANISING INITIATIVES

In this section, we report the survey responses regarding the organisers' demographic backgrounds and their values. Lastly, we briefly describe findings related to how the organisers in *general* approach the organisation of game jams. Organisers are represented by an "O" followed by their survey respondent number.

5.1 Demographic Backgrounds

Twenty-seven game jam organisers responded to the survey, 18 self-identified as male and nine as female, aged between 24 and 48 years, with an average age of 33,2. The organisers were distributed in 12 countries: Denmark (7), U.S. (6), Finland (4), Poland (2), Austria (1), Germany (1), Ireland (1), Japan (1), Netherlands (1), Norway (1), Sweden (1), and U.K. (1). The organisers had each organised between 1 and 25 game jams, with the average number of organised game jams being 7,7, while the median was 6. Though the number of respondents is fairly low, we emphasise that the majority of the respondents were quite experienced in organising game jams. Also, it is important to note, that there are no statistics on how many active game jam organisers there were in the studied countries. To provide context, we compared this number to the GGJ locations in 2019 [31]. Global Game Jam requires the locations to have at least one organiser responsible of the jammers per location, so we know for sure that there were at least 364 organisers active in 2019 in the studied countries. Based on experience and involvement in local game jamming communities in Europe, we know that it is not atypical to run a GGJ location as an individual effort, or with a relatively small team, and GGJ organisers are commonly involved in other game jams in the locations.

5.2 Game Jam Organising Values

On a scale from one to five, the organisers rated how important they found different statements in relation to aspects of organising game jams, see Figure 1. The two statements where most organisers gave the highest rating were *Participants have fun* and *Participants get to be creative*. Furthermore, three other statements stood out on the highest rating of the Likert scale: *Participants get to know new people, New ideas are explored* and *Organisers support participants' creativity*. Overall, the organisers were more neutral on the following statements: *Participants learn something, Participants can add a game to their portfolio* and *New technologies are explored*. In relation to our research interest, participants' creativity thus seemed to be important to the organisers, and most of them further agreed that supporting participants' creativity is an important aspect of organising game jams.

5.3 General Organising Initiatives

We provided a list of typical initiatives related to the pre-development phase (see Table 1) and development phase (see Table 2), which the game jam organisers could choose from, and they could add

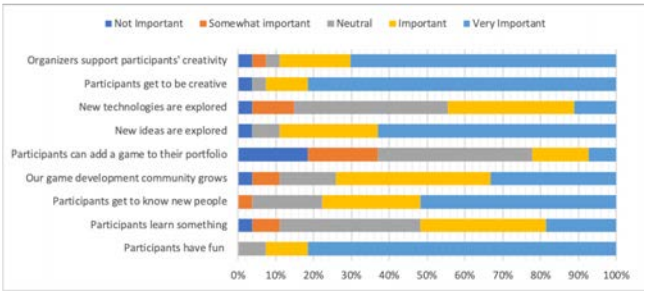

Figure 1: A five-point Likert scale showing the distribution of how organisers rated each statement related to aspects of organising game jams.

Did you facilitate the pre-development phase?	
Yes, we provided a theme to inspire the participants.	21 (77,8%)
Yes, we offered additional design constraints.	10 (37%)
Yes, we organised a brainstorming session.	15 (55,6%)
Yes, we offered creativity exercises.	5 (18,5%)
Yes, we offered talks to inspire the participants.	15 (55,6%)
Yes, we offered tangible objects, such as ideation cards, modelling clay, LEGO etc.	6 (22,2%)
Yes, we facilitated the group forming.	21 (77,8%)
No, we did not facilitate the pre-development phase in any particular way.	2 (7,4%)
Other	6 (22,2%)

Table 1: Organisers responses to how they facilitated the pre-development phase. The organisers could also add other options.

Did you facilitate the development phase?	
Yes, we provided mentors during development.	14 (51,9%)
Yes, we provided software during development.	7 (25,9%)
Yes, we provided physical materials during development (such as cardboard, Makey Makeys, controllers).	15 (55,6%)
Yes, we provided workshops during development.	5 (18,5%)
Yes, we held a show-and-tell session in the middle of the game jam.	10 (37%)
No, we did not facilitate the development phase in any particular way.	1 (3,7%)
Other	10 (37%)

Table 2: Organisers responses to how they facilitated the development phase. The organisers could also add other options

other initiatives as well. As shown in the tables, the organisers took several different initiatives when organising the game jams. Though these initiatives for facilitating the pre-development and development phase were not necessarily intended to explicitly support participants' creativity (except for the option with creativity exercises), some of the initiatives strive for *inspiring* the participants and hence have potential to influence participants' creativity. These initiatives were: *providing a theme, offering additional design constraints, organising brainstorm sessions* and *inspirational talks*.

6 HOW ORGANISERS UNDERSTAND CREATIVITY

This section presents the findings from our thematic analysis of the survey responses pertaining to how the organisers understand creativity in game jams in terms of the four key creativity aspects.

6.1 Novelty

Novelty was often described by the organisers as a goal for a final game prototype (O1, O6, O17, O15). O1, for example, expressed how: "[Creativity is] about making games that you have never seen before or making them in a different way or with different things." For O15, O18, O25 and O26 the novelty aspect of creativity in relation to game jams applied not only to the *final game prototype*, but also to the game making *process*. Novelty in this regard was generally described as "trying new things, stepping outside of your comfort zone as a game developer, finding solutions to problems in ways you hadn't thought about before" (O26). O18 and O25 both echoed this view and elaborated that creativity in game jams is about "Trying something new and different (from new tech, process, ideas to interacting with new people)" (O18), and to "break the confines of what you would normally do when making a game. That you are open to your team mates and something comes out you might not have expected" (O25).

6.2 Risk-taking

An oft-mentioned aspect in relation to creativity in game jams was the encouragement of risk-taking and experimentation among participants in order to ensure that "[j]ammers feel like they have a safe place to explore new ideas" (O14). O12 reflected this statement as well: "To facilitate creativity, I try to make a space where it is okay to fail. To have fun with it. To have tools and facilities for people to play around and mess with." O20 and O27 agreed with this understanding, and O2 added how a game jam is about "Quick, consequence-less experimentation with untested game ideas and processes." This means that participants step outside of their comfort zone (O26) and explore new ideas, which "they maybe normally wouldn't when trying to make a commercial game" (O8). O14 emphasised that participants have to feel like they have a safe space in order to do this in a game jam.

6.3 Combinational Creativity

This aspect of creativity in game jams reflects what a few of the organisers described as for example "Taking old concepts and turning them upside down or combining game mechanics [with] other game types" (O5). This aspect of combining or "smashing existing concepts together" (O6) or "Combining ideas in unorthodox ways" (O19) was referred to as a way of obtaining novel game ideas. Even though only three of the organisers mentioned this kind of combinational creativity as a way of understanding and, in turn, promoting creativity in game jams, it manifests an important aspect of creativity. Exploring this aspect further might be a fruitful path for organisers to pursue. We elaborate on this in the Discussion.

6.4 Creativity Constraints

Constraints as an aspect captures how the organisers referred to working with for example technology and how, in a game jam, it can be liberating: "The freedom to do whatever you want with the technology at hand [...] Freeing the mind from technological constraints to technological freedom" (O4), while some acknowledged that it can also be potentially restraining: "[Creativity means] That you don't feel worn down by technological challenges so you are free to explore [...]" (O11). O3 and O22 likewise referred to game jams as an opportunity for avoiding constraints that are usually restraining the development of games: "It means freedom of usually restraints put on developers in [their] day to day work and possibility to explore out of the box ideas" (O3). According to the organisers, this freedom of constraints means that the participants can engage in "Trying out crazy ideas you would not have chance to create otherwise, testing new technology" (O22) and "exploring an idea for the sake of the idea without being held back by concerns of commercial viability or strength of audience or other feasibility limits" (O21). While the statements above reflect a view on creativity in game jams as a way of avoiding or being free of constraints, O12 in contrast explained how constraints were to be expected in a game jam and emphasised how "game jam venues and budgets put various restrictions on what can be achieved" and that participants' process mean: "often (if not always) encountering a lot of obstacles, frustrations, unknowns and happy accidents along the way." Though constraints are encountered and experienced as restricting, they can also drive and focus a participant's creative process. O12 elaborated on how this might be done by providing concepts such as: "Themes, Restrictions, Divirsifiers [sic], Example game jam games, explaining what scope is". O24 emphasised that for the organiser, creativity is then about: "the ability to select the theme of the Jam. Here, creativity comes in the form of a theme that is vague but still inspiring for the jammers with good potential design space" (O24). This view was echoed by O26, adding that it is up to the organiser to: "finding new ways to make the experience more fun and rewarding for the jammers." Whether game jams were seen as being free from, naturally containing or even driven by creativity constraints, the selection (and thereby deselection) and organisation of constraints seem to be regarded as an important aspect of how organisers can influence participants' creativity in game jams.

7 HOW ORGANISERS PROMOTE CREATIVITY IN GAME JAMS

When asked whether the organisers arranged for promoting and supporting creativity during the game jam, 20 organisers responded positively and mentioned different initiatives in relation to supporting creativity. Seven organisers responded that they did not actively support creativity. In total, 21 (77,8%) of the organisers facilitated the group forming, see Table 1. In the following sections we report five types of initiatives that the organisers took for supporting creativity in particular: Establishing the Physical Surroundings, Supplying Tools and Materials, Selecting a Theme, Providing Talks and Facilitating Discussion, and Organising Activities.

7.1 Establishing the Physical Surroundings

For supporting creativity in particular, some organisers mentioned different initiatives concerning the physical environment of the game jam. Based on a keynote talk, participants in one game jam were advised on how they could support creativity by "dressing up your jam area and trying out new 'instruments'" (O2). Some of the initiatives on supporting creativity using the physical settings explored were: providing art installations (O2); games which the participants could play (O11); dedicated rooms used for relaxing during the game jams (O3, O11); and mobile escape rooms (O4).

7.2 Supplying Tools and Materials

Specifically in relation to facilitating creativity, some organisers mentioned how they provided materials for the participants, such as: "paper, markers, and space" (O21), "motion capture suits, assets for Unity Asset store" (O2), and "a dome, and there was a person instructing on how it can be used for game making" (O8). In O21's case, the game jam brought together: "research experts in different science and social science fields and pair[ed] them with teams of developers." For facilitating creativity in this particular research-focused game jam, they furthermore asked the researchers to: "bring any items or media they feel is helpful for this process" (O21). Six (22,2%) organisers stated that they offered materials, such as ideation cards, modelling clay, LEGO etc., in the early phase of the game jams before development started (Table 1), while 15 (55,6%) organisers provided physical materials, such as card boards, Makey Makeys, or controllers during the development phase of the game jam (Table 2). Seven (25,9%) organisers provided software (Table 2).

7.3 Selecting a Theme

A recurring aspect in game jams that has been framed as an essential part of what defines a game jam is the use of constraints, for instance the selection and revealing of a theme meant to inspire the participants [39]. Twenty-one (77,8%) organisers stated that they provided a theme for the game jam, and ten (37%) stated that they provided "additional design constraints", see Table 1. Some organisers facilitated discussions regarding the theme among the participants (O2, O17, O24). Providing a theme was framed as a concrete initiative for supporting creativity (O24).

7.4 Providing Talks and Facilitating Discussion

Fifteen (55,6%) of the organisers offered talks to inspire the participants (Table 2). Six organisers specifically mentioned talks as a way to support participants' creativity (O2, O4, O7, O9, O16, O26). O2 explained that talks could be used to suggest participants "[...] how to jam creatively [...] and what concrete steps you can take." O7 mentioned "expert talks" and O26 "lightning talks,", which are short presentations of often only a couple of minutes. An interesting example was brought up by O20, who organised a round-table conversation with a monk for participants in a game jam combining games and religion. Besides providing talks, some organisers arranged discussion among the participants as a way to facilitate creativity. As reflected in the following statement, these organisers focused on "getting people together and talk about their project and the subject matter" (O20). O23 was further concerned with facilitating conversations between participants who were not in the same teams. A way for the organisers of facilitating these discussions was walking around to participants and initiating conversations with participants about game ideas and the jam theme (O24, O17), and even help the participants if they were stuck (O25). Some organisers had invited experts to their game jams to initiate conversations with the participants. These experts were for example: "research and game development mentors" (O26) and "Scientists and a game industry pro [...]" (O10). Fourteen (51,9%) organisers provided mentors during the game jam (Table 2).

7.5 Organising Activities

Several organisers stated that they organised a wide range of different kinds of activities intended to facilitate participants' creativity. Some examples of these activities were: show-and-tell sessions (O19), which ten (37%) organisers facilitated (Table 2); "stand up check-ins" from the organisers (O16), which were repeated every one-two hours throughout the jam; physical warm-up games (O25); "small creativity exercise at the beginning of the event" (O19), five (18,5%) organisers stated that they organised exercises for creativity in particular; brainstorming exercises; social exercises such as "speed dating" where: "jammers got to brainstorm & know each other a bit more" (O8); outside activities; letting the participants swim with toys or facilitating play between participants and refugee children (O20). O12 encouraged participants to take breaks during the game jams, as they believed this: "[...] helps people to connect and have fun, to take a step back from what they are working on, discuss their progress and assess what they should be aiming to achieve next." O26 organised a game jam where participants made games based on climate scientists' research. A 90-minutes *brainstorming session* was organised where the participants could brainstorm ideas together with the scientists, who could also be present during the game jam. In the same game jam, a *playtest session* was also arranged during the game jam, where the participants could play each other's games. Five (18,5%) organisers facilitated some kind of workshop during the development phase (Table 2).

8 DISCUSSION

The discussed insights below for advancing the organisers' practice must be considered in the light of the preliminary character of this study, which we stress is meant as a stepping stone toward more elaborate investigations into the critical importance of creativity in game jams. Table 3 provides an overview of the four creativity aspects, which aspect the organisers' initiatives relate to, and how organisers may further their practices based on recommendations from creativity research.

8.1 Inducing Novelty

An aspect widely represented in the organisers' statements concerned novelty with regards to the participants' game ideas as well as their creative process. Usually in creativity research, novelty is an aspect that concerns the outcome of a creative process [60]. The findings show that some organisers also intended to support and encourage novelty in the participants' process, and thereby indirectly in the developed games, by taking initiatives to introduce elements of surprise, which is a key component of novelty [19]. We see the initiatives described in section 7.4 and 7.5 as closely related to the aspect of novelty, since several of these initiatives aim to introduce elements of surprise. Studies have shown that being *aware* of how creativity works in practice can enhance one's creative abilities [54, 65]. In the context of game jams, organisers can provide talks that specifically revolve around how everyone is capable of being creative, the underlying concepts of creativity and how these may be applied in practice [54]. Furthermore, studies suggest that spending one's time on searching for and exploring a problem, rather than on solving a problem, can lead to more creative solutions [59, 61]. Therefore, facilitating the idea generation phase could be given much more consideration in order to guide the participants to thoroughly explore the design space. Divergent thinking is critical for generating novel concepts [1, 15, 24] and

Theoretical aspects	Organiser Initiatives	Research-based Recommendations
Novelty	Providing Talks and Facilitating Discussion	Provide talks on how everyone is capable of being creative, the underlying concepts of creativity and how these may be implied in practice [54]
	Organising Activities	Encourage divergent thinking [1, 15, 24]
		Spend time on problem searching rather than problem solving [59, 61]
		Introduce elements of surprise [19]
		Unusual uses for common objects [59]
Risk-Taking	Supplying Tools and Materials	Provide new and unfamiliar tools and materials to challenge prototyping processes
		Explicitly communicate the value of taking risks [12]
		Use stand-up check-ins to verbally encourage taking risks during game jam [63]
		Provide prizes for most risky idea [63]
		Organise intermediate-level competition [2]
		In non-competitive game jams, consider change in group memberships [2]
Creativity Constraints	Establishing the Physical Surroundings	Consider how tools and materials may act as creativity constraints
	Selecting a Theme	Encourage participants to articulate their own constraints [3]
	Supplying Tools and Materials	Consider highly visually interesting environments [45, 57]
Combinational Creativity		Deploy ideation tool kits [28]
		Provide creativity exercises for combination (combining ideas that do not fit together naturally, make analogies, meet people unlike oneself) [59]
		Provide theme-encouraging combinations

Table 3: The left column of the table shows the four creativity aspects, the middle column shows which creativity aspects the organisers' initiatives reflected, and the right column shows how organisers may further their practices. We did not identify organiser initiatives specifically aimed at supporting combinational creativity, therefore the corresponding field is empty.

is about exploring a broad range of possibilities instead of focusing on a single idea. A concrete activity for supporting divergent thinking during an ideation phase of a creative process is listing unusual uses for common objects [59]. In the context of game jams, participants could be encouraged to generate ideas for common objects inspired by a given theme and then list unusual uses for these objects. These unusual uses can potentially be related to the *dynamics* in a prospective game idea. Dynamics is part of the MDA framework and describes the "run-time behavior of the mechanics acting on player inputs and each others outputs over time." [30]. As means to support the overarching goal of novelty, the following sections discuss concrete approaches to risk-taking, creativity constraints and combinational creativity.

8.2 Encouraging and Rewarding Risk-taking

Risk-taking makes people more likely to produce novel ideas [12]. This aspect is characteristic for game jam formats where participants are often encouraged to step out of their comfort zone and try something new. Both creativity and design research have established tolerance of *ambiguity* as a key part of creativity [18, 67]. A part of taking risks is for the participants to remain comfortable in an ambiguous phase where they might run the risk that the game idea they try to develop may not be realisable within the short timeframe of the game jam format. Several organisers were mindful of risk-taking as an aspect of creativity in game jams. One example is O12, who provided *tools* for the participants to "play around and mess with" in order to create a space safe for failing, and, hence, taking risks. In that perspective, selecting and providing certain tools that are novel and unfamiliar for the participants can be a way of challenging the participants' prototyping and enable them to experiment and taking risks with the tools. The initiatives in section 7.2 can therefore also be seen as potential ways of encouraging risk-taking. Encouraging risk-taking through *communications* and *instructions* plays an essential role [12]. Creating a space where it is acceptable to fail can be done by explicitly communicating the value of taking risks. One obvious example of communicating risk-taking would be to utilise the already-common practice of offering talks to the participants or show examples of game jam games. However, according to Sternberg [63], it is not enough to only encourage risk-taking; it must also be *rewarded*. Organisers can consider how risk-taking may be further rewarded if they want to create a safe space for this type of experimentation, for instance by using stand-up check-ins to verbally reward risk-taking during the game jam, or announce prizes that reward risk-taking. For encouragement of risk-taking, one may consider what the effect of a competitive game jam format entails, i.e. does competition increase or reduce risk-taking? Studies suggest that a *balanced* level of competition best support the development of risky and creative ideas: "too little, and high performers lack incentive to develop new ideas; too much, and agents stop investing effort altogether" [22]. Similarly, Baer et. al. found that in groups where the membership is *stable*, only an intermediate level of competition is necessary to stimulate elevated creativity [2]. Game jam organisers can consider an intermediate level of competition, corresponding to the top ten creative groups as winners [2]. If a non-competitive game jam format is preferred, Baer et. al.'s study further suggests that a change in membership of a group during an event can be a mechanism for enhancing group creativity [2].

8.3 Identifying and Utilising Creativity Constraints

As the analysis showed, the organisers perceived game jams as having both a liberating and a restricting effect on participants' creative processes. Supporting and facilitating creativity in any context requires a balance between both freedom and constraint [3, 33]. The role of constraints was widely represented in the organisers' statements; however, we did not see the responses reflect how creativity constraints can at the same time serve this critical *dual role* [8]. This corresponds to the findings of Kultima [38] where an analysis of organisers' discussion and selection of a game jam theme showed that some organisers viewed the theme as a rigid constraint, while others found the theme flexible and negotiable. Gaining insights into the different ways in which creativity constraints can *both* render certain ideas possible while constraining

others, and identifying these constraints in a game jam, serves as a valuable resource for game jam organisers. There were several ways in which the organiser initiatives reflected the aspect of creativity constraints. The time constraint is but one obvious example. Another constraint is the selection and revealing of a specific theme that the participants may draw inspiration from, as described in section 7.3. Several organisers mentioned how an important part of the organiser's role is exactly the selection of the specific theme. Inspired by creativity training, organisers can also encourage participants to articulate their own creativity constraints in addition to the game jam theme, i.e. who will the game be for, what are the properties of the materials they are designing with, what are the constraints of time, aesthetics, etc.? [3]. The dual role of creativity constraints may also be considered in the selection of which tools and materials to provide at a game jam. The tools and materials described in 7.2 is then not only related to risk-taking, but can also be framed as *creativity constraints*. Some tools might enable certain types of game ideas due to the inherent qualities and affordances of the tools, while at the same time making other game ideas less obvious for immediate exploration [11]. A game engine for creating 2D games, for instance, may prompt game ideas that specifically utilise a 2D perspective, while a game engine for creating 3D games may prompt other kinds of game ideas that draw on the qualities of a 3D perspective. Creativity constraints also include what constitutes the *physical environment*, which has been shown to have an effect on creativity [4, 57]. The initiatives described in section 7.1 can therefore be framed in this perspective. Here, research has found that especially highly visually interesting environments are important for perceived support of creativity [45, 57]. This highlights the importance of considering how the physical environment of a game jam should be planned and designed in order to best support creativity.

8.4 Applying Combinational Creativity

According to Onarheim and Friis-Olivarius, the two main approaches to supporting and facilitating creativity involve enhancing the *creative environment* and *creativity training* [54]. Section 8.3 described how the environment can be framed via creativity constraints. This section is primarily based on insights from creativity training programs and pertaining creativity methods. Novelty can be attained when ideas are combined; however, the combination of elements must be carried out systematically [10] and not randomly, and where there is a point or "intelligible conceptual pathway between them" [8]. Although a few organisers understood creativity in game jams as what we identified as combinational creativity, we did not identify any concrete initiatives reflecting this aspect. In game jam research, the potential inherent in combinational creativity has previously been explored. Xavier Ho noted that ideation tool kits can support a systematic way of combination: "Many idea generation tool kits combine two unlikely ideas and create improbable combinations to stimulate creative thinking [...] This unique combination is a key element to inspiring new game designs" [28]. Following this proposition, which confirms findings by Kultima and Alha [41], our recommendation would be that organisers offer such tool kits to their participants, or facilitate creativity exercises to support combinational creativity, individually or collaboratively. As a potential starting point, Sawyer describe a number of creativity exercises that may support participants in applying combinational creativity [59]. Organisers can facilitate these kinds of exercises or provide instructions on how to implement them. Organisers can also consider utilising the theme to encourage combinational creativity; for instance by suggesting that participants combine specific game genres or game mechanics that the participants could either select from a list prepared by the organisers, or discern themselves by analysing and discussing one or more such examples.

8.5 Limitations

Using a survey to investigate how game jam organisers understand and promote participants' creativity has provided insights into salient aspects of this particular relationship [68]. In general, surveys are useful for leveraging insights into for example *demographics, attitudes, experiences*, and *intentions* [50], which this paper has shed light on in the specific context of organisation of game jams. Furthermore, undertaking an online survey-study format enabled efficient distribution of the study, resulting in a *broad range* of responses by 27 organisers from 12 countries. Even so, it can be challenging to gain insight into more *detailed* and *processual aspects* of a phenomenon via a survey. Beneficial directions for future research on how organisers understand and promote creativity in game jams would therefore be interview studies and observational in-situ studies of organisers, where more detailed and processual knowledge can be leveraged. Creativity is a complex phenomenon whose research field involves many different and potentially relevant areas, which this paper, given its scope, cannot cover exhaustively. Although four key creativity aspects do not capture all complex facets of creativity as a phenomenon, we argue that the four key creativity aspects have managed to capture some of the most *prominent* and *central* themes of creativity as it specifically occurs in how organisers understand and promote it among game jam participants. Future research can further explore the four creativity aspects, or how other aspects influence creativity, such as the location (whether it is online, physical or a hybrid), competitive and non-competitive game jam formats or how to support different experience levels of the participants.

9 CONCLUSION

Based on a thematic analysis of survey answers from 27 international game jam organisers, this paper has shown how four key aspects from creativity research, namely novelty, risk-taking, combinational creativity and creativity constraints, can serve to contribute new insight into this specific organisational creativity practice. Our study has revealed that game jam organisers already appear to initiate a number of activities specifically to support participants' creativity; however, we have also discerned and addressed additional organisational initiatives to be incorporated by taking into consideration some of the current insights from creativity research. In closing, we believe that researching game jams as a platform for advanced expressions of creativity holds great potential and calls for more research that can help capture the fluidity and diversity in not only the game jam formats, but also in the intended goals and, ultimately, in the game jam games that emerge from these creative accelerated design processes.

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