Readymades & Repertoires: Artifact-Mediated Improvisation in Tabletop Role-Playing Games

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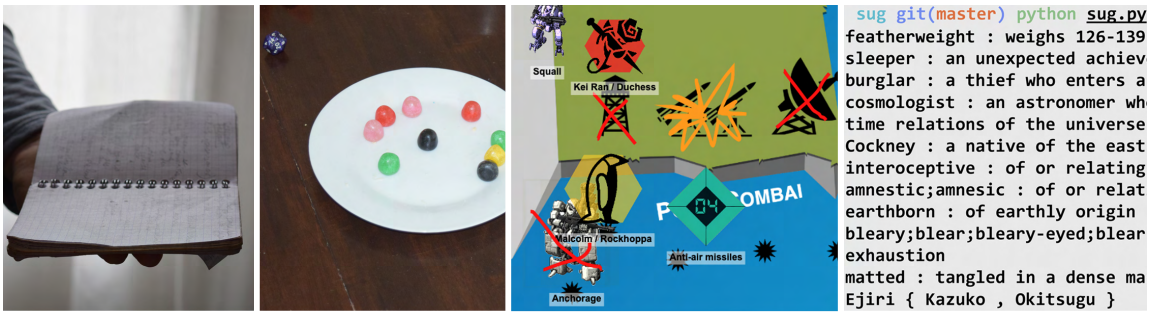

(a) (b) (c) (d)

Fig. 1. Examples of artifacts used by GMs: (a) P2's notebook; (b) winegum candies on a plate representing characters in combat; (c) map in Roll20 with iconography representing player and non-player characters, and landmarks; and (d) a Python application that provides five nouns and five adjectives from WordNet and a potential character name to help P1 come up with character ideas.

Game masters (GMs) are creative practitioners who plan and orchestrate tabletop role-playing games. Through an interview study, we investigate how eight expert game masters adapt everyday technologies and materials as creativity support tools (CSTs) for improvisational and collaborative play. We integrate theories of improvisational and distributed creativity with the human-artifact model, which provides an activity-theoretical vocabulary for analyzing the mediating relationships between specialist practitioners and their tools. We show how GMs prepare and deploy *readymade artifacts*: analog and digital CSTs that flexibly mediate recurring creative tasks in their practice, such as improvising narrative elements, facilitating smooth play, and creating aesthetic effects. We find that GMs demonstrate designerly thinking as they create, share, and refine repertoires of readymade artifacts. We argue that our theoretical approach can inform future studies of IT-mediated creativity, and that readymade artifacts can be an analytical and generative concept for the design of novel creativity support tools.

CCS Concepts: • **Human-centered computing → Empirical studies in collaborative and social computing**; **Empirical studies in HCI**; **Collaborative content creation**; **Computer supported cooperative work**.

Additional Key Words and Phrases: distributed creativity, performance creativity, activity theory, game master, creativity support tools

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1 INTRODUCTION

Frich et al. argue that a key agenda of the HCI and Creativity Research communities is to develop new digital creativity support tools (CSTs), but that there is a lack of work integrating the knowledge and methods of these two fields [34]. To address this disconnect between HCI and Creativity Research knowledge, they advocate four research initiatives: (1) integrating and developing descriptive and design-oriented theories; (2) adapting methods to study existing computer-mediated creative work in real settings; (3) collecting exemplar cases of creativity support tools with real-world use; and (4) prototyping novel creativity support tools to assess theoretical models.

We contribute to this research agenda as we investigate a case exemplifying the real-life use of diverse creativity support tools, that of *tabletop role-playing games* (TRPGs). TRPGs have seen a resurgence in recent years [12, 13]. In these games, players collaboratively improvise narratives by portraying imaginary characters in fictitious worlds [31]. Typically, these games have one player, the *Game Master* or *GM*, who takes on the role of director for the narrative, orchestrating all aspects of the game world, minus the actions of the other players' characters. The challenging role of the GM benefits from expertise in improvisation and theatrical performance, e.g. [50]. GMs must skillfully prepare and facilitate narrative improvisation with players using combinations of storytelling techniques, pre-planned steps, game rules, and physical and digital artifacts [31, 36, 39, 40, 62]. However, we lack understandings for how physical and digital artifacts may function as CSTs for GMs as they foresee and orchestrate improvised narratives. Frich et al. [34] show that there is a lack of empirical and theoretical work related to understanding the role of tools, i.e. mediating artifacts, in creative practices. Existing theories of improvisational and social creativity focus on cognitive and communicative aspects of creative acts, eliding how these acts are entangled with physical and digital tools. We address this gap with a focus on TRPGs as improvisational creativity. We chose GMs as the subject of our study because they rely extensively on physical and digital artifacts in their creative practice.

We investigate how expert GMs create, manage, and use artifacts (e.g. Figure 1) as personal CSTs in improvisational and collaborative play. We apply the critical incident interviewing technique [32, 45] and the human-artifact model [18] to gather and analyze rich data about artifact use in real settings. Our analysis uncovers how GMs prepare and interact with artifacts in diverse contexts, and then employ them during play to support improvisational storytelling by the GM and players. Our analytical approach integrates theories of improvisational and social creativity with activity theory, which provides well-developed tools for understanding artifact mediation. This approach lets us identify characteristics of GM artifacts that are salient to their creative challenges and goals. We summarize these characteristics with the analytical and generative concept of *readymade artifacts*, physical and digital tools used by GMs to create and draw on reusable units of improvisation. We argue that this concept holds promise as an aid for designing novel CSTs for GMs.

In this paper, we first develop our research questions and theoretical perspective on the creative practice of TRPG play. Next, we describe our interview study and analytical process. We then present our findings on how GMs use artifacts as creativity support tools in mediating improvisational and collaborative play. We discuss how our findings may be used in the design of future creativity support tools and how they motivate further theoretical and empirical work on artifact-mediated creativity. We conclude with a summary of our contributions and directions for future work.

2 BACKGROUND

We characterize TRPG play as narrative performance directed by the GM and mediated by player conversations and diverse artifacts, including computing technologies. We review HCI research that has developed novel prototypes for TRPG play, and identify a lack of empirical and theoretical grounding in that work. We situate TRPG play in Creativity

Research theories of improvisational and distributed creativity, but note a lack of consideration for artifact use in these theories. We address this lack by introducing activity-theoretical HCI for studying artifact use in real-life contexts.

2.1 Tabletop Role-Playing Games: Narrative Performance, GM Roles, and Technology

To contextualize our study, we articulate TRPG play experiences as narrative performance and identify the various responsibilities of GMs. We focus on TRPGs that closely resemble the prototype form described by Fine as games in which *"a number of players assume imaginary characters and operate with some degree of freedom in an imaginary environment"* [31, p. 6]. Players each take the role of a player character (PC), forming an adventuring group or "party" that works together to explore the world and overcome challenges. Fine describes the GM as a referee of the narrative, responsible for establishing not only the setting, but *"a worldview that directs the game action and represents the implicit philosophy or ideals by which the world operates"* [31].

Tabletop role-playing games take place as a conversation among players and the GM in which they create a shared fictional narrative. Individual conversational exchanges perform functions such as (a) establishing particular events, occurrences, or circumstances as true within the fiction, (b) settling disputes or disagreements about those events, and (c) maintaining a shared understanding among participants about the facts of the game world [40]. Beyond spoken language, this conversation involves multiple forms of physical and digital artifacts, such as paper sheets and miniature figurines to represent characters, dice to semi-randomly resolve the results of actions by PCs, and maps to establish the layout of the fictional world [24, pp. 8–12].

Through conversation, players produce an improvised narrative performance [44]. This performance is partly structured by game rules. Game rules often give the GM final say, allowing them to direct the narrative flow [62] while establishing power relationships with other players [39]. GMs leverage these relationships, using attractors to entice expected behaviors and detractors to discourage certain actions [33]. This creates three frames of connected activity: one for game play, one for narrative, and one for social activities, such as out-of-character jokes and discussions [24, 31, 44]. These frames interact, e.g., when the rules call for a dice roll to determine the success or failure of a narrative action, or when the players laugh at their bad luck upon seeing the result.

The prototypical form of TRPGs was primarily codified by the first popular game system, *Dungeons & Dragons* (D&D) [38], which was designed to enact fantasy stories inspired by fictional worlds such as Tolkien's Middle Earth. Many game systems share the main characteristics of this form, but are designed for other fictional genres such as science fiction, detective stories, and horror, while "generic" systems are designed to be adapted for different genres and settings. White et al. [66] review the history of TRPGs and their major forms, including TRPG traditions that depart from the prototype form described here, e.g. games without a GM, games where players do not portray individual characters, or games without dice-roll-based rules for resolving character actions.

2.2 Human-Computer Interaction Design for TRPGs

For the last two decades there has been sporadic but perennial research interest from different corners of HCI in introducing digital technologies into TRPGs to create enhanced play experiences. These researchers argue that introducing computational elements—including animated visuals [47, 48], tangibles [51], interactive wearables [14–16], mixed-reality environments [63], or communication tools [7]—can enhance experiential qualities such as player satisfaction, immersion, and engagement. The theoretical approaches and evaluation tactics in this prior work reflect a focus on TRPG play as user experience, rather than as a skillful collaborative activity. They employ strong concepts from HCI [41], such as interdependent wearables [42] and calm technologies [65], to address user experience issues such as

interfaces placing high demands on player attention. Their evaluation methods typically assess effects of prototypes through constructed play scenarios, followed by user experience interviews and questionnaires.

By contrast, we believe it is fruitful for HCI researchers to view novel prototypes for TRPG play as creativity support tools, enabling players and GMs to develop and leverage their creative skills. Acharya [1] provides a standout example of such an approach: she designs a toolkit for preparing adventure modules—guides that provide pre-constructed narrative and game elements for GMs to use—as interconnected information nodes that can be modified, annotated, and visualized as a flowchart for guiding game facilitation. Acharya empirically studies the goals and techniques of expert GMs when they prepare and facilitate games. Her toolkit is designed to support the development of these goals and techniques in novice GMs.

We aim to support similar design approaches in future work by providing a robust theoretical and empirical basis for GMing as a creative discipline, and for GM tools as creativity support tools. We investigate the diverse roles that artifacts play in GMing practice, identifying reasons why GMs adopt and adapt particular tools into their practice. By providing an account of GM artifact use and creative motivations and goals, we enable CST design work for TRPG play that can be driven by and evaluated through creativity models, addressing an existing gap identified by Frich et al. [34, 35]. We relate our empirical findings to constructive HCI research in section 5.1.

2.3 Theories of Improvisational and Distributed Creativity

We frame our investigation of TRPGs within the context of improvisational [53] and distributed [55] creativity. Typically, GMs do not go into a play session knowing how the narrative will completely unfold, and even where they plan their stories in great detail beforehand, both rule systems and the dialogical nature of play act to inject uncertainty [23]. Thus, we can characterize TRPG play as a type of conversational improvisation, distributed among the players.

Sawyer develops a theoretical model to describe commonalities among domains of creative practice based on improvised performance, such as small-group jazz and improv theater [53]. Sawyer describes improvised performance as a conversation in which performers' exchanges form an *emergent*, the unique and ephemeral content and constraints of the particular performance [53, p. 175, fig. 1]. Performers contribute to the emergent through *creative entailments*, such as speaking a line in an improvised sketch, or playing a short musical phrase. The emergent both constitutes the performance, and constrains how the performance may develop, according to the conventions of the performance genre and the choices of the performers.

Expert performers use *readymades*, prepared units of improvisation that they draw upon during performance [53, pp. 175–179]. Sawyer and other creativity researchers have primarily identified readymades in jazz and improv theater, two well-studied improvisational art forms [4, 43, 46, 53]. In jazz, Sawyer identifies the musical "lick"—short musical phrases prepared through practice and drawn from memory in performance—as a paradigmatic example of a readymade. In improv theater, several scholars have described different types of agreed-upon structures that act as readymades. Sawyer highlights clichés [54], while Johnstone describes how performers shape stories by remembering and reincorporating incidents [43], and Schechner identifies *strips of behavior* that performers rearrange and reconstruct as material for performance [56]. Performers prepare personal repertoires of clichés, remembered incidents, and strips of behavior, and draw on them in seemingly spontaneous performances. We anticipate that GMs similarly rely on reusable units to support their improvisations and establish emergents within the narrative performance of TRPGs.

Readymades and other units of improvisation represent individualistic internalization of improvisational processes that support creativity when used in performance, helping construct an emergent. Sawyer and DeZutter [55] identify non-individualistic creative processes that they call *distributed creativity*. In their empirical study of improv theater

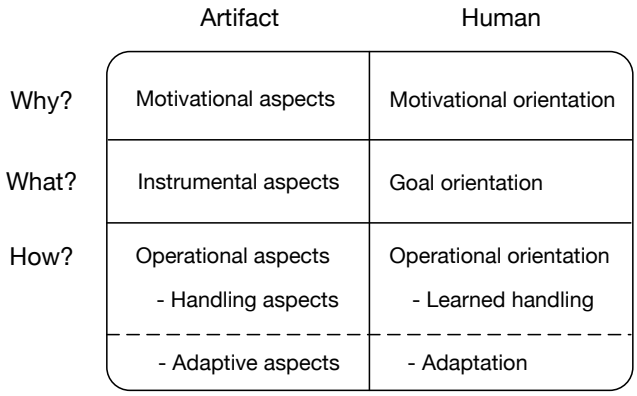

Fig. 2. The human-artifact model [18]. On the left, the mediating aspects of the artifact describe the assumptions about use that are crystallized in the artifact. On the right, the orienting basis of the human, i.e. the subject of the activity, describes the needs and capacities that they bring to the activity. The artifact side is shaped by design goals and conventions, production constraints, etc., while the human side is shaped by the user's desires, formal training, daily routines, etc.

students developing a set of comedy sketches, they describe improvisational creative activity beyond single performances, where narrative elements (e.g., characters and events) are invented, refined, and stabilized over the course of many performances of the same sketch over time. The shared emergent that defines these narrative elements is distributed among performers who take turns embodying the same roles. We suspect TRPGs that take place over more than one play session similarly exhibit emergents where improvised narrative elements are distributed among players and artifacts.

The critical missing component from this description is the role of materials and tools. Objects such as costumes, props, and instruments are mentioned briefly, but creative entailments are primarily understood as mental processes punctuated by an utterance, rather than as interactions with the material world. In the case of TRPGs and GMs in particular, external artifacts such as rulebooks, dice, character sheets, maps and so on are perennially present in play. So then, what role do those artifacts play in the processes of executing entailments and preparing readymades?

2.4 Accounting for Artifacts with Activity Theory

We draw in activity-theoretical HCI for a well-developed theory of technology-mediated human interaction that encompasses the use of diverse tools and has been shown to support the design of novel tools. Activity-theoretical HCI adapts cultural-historical activity theory to the study of computer-mediated interaction [2, 8, 11, 17–19].

The central unit of analysis in activity theory is human activity, which is understood as a recurring system rather than an ephemeral process. Human activity is mediated by artifacts and directed towards objects. Objects are the raw materials and envisioned outcomes of an activity, the thing that is being worked on. For example, in the activity of writing a research paper, the authors' object is both the draft that they contribute to and edit, and the envisioned final paper that they keep in mind as they write. Artifacts are the tools that *mediate* activity, i.e. shape and extend the capabilities of human subjects pursuing an activity. In the writing example, artifacts might include a cloud-enabled word processor that lets distributed authors collaborate in real time, as well as the printers, paper, and pens used to annotate draft versions of the paper. CSTs are key artifacts of creative practitioners and disciplines. In activity-theoretical terms, the support provided by CSTs is found in their role as artifacts mediating creative activity.

We apply the human-artifact model (HAM) [18] to describe and analyze the nature and structure of the mediating relationship between GMs and and the artifacts they employ in preparing and facilitating games. Bødker and Klokmose developed the HAM as a summary and synthesis of key concepts across the activity-theoretical HCI literature [18]. The model is summarized in a diagram expressing two analytical dimensions (Figure 2).

On the horizontal axis, the human-artifact model positions the artifact and the human. The artifact is described in terms of its *mediating aspects* [18, pp. 11–15], the means by which artifacts remind us of what is possible, constrain what we might do, and give us particular capabilities. Mediating aspects include its physical form and materials, its user interface, language, and look and feel. The human user is described in terms of their *orienting basis* [18, pp. 15–18], which can be understood as the capacities and expectations with which the user meets the artifact, including their desires, past experiences with tools, and situational goals.

On the vertical axis, the hierarchy of activity provides three sets of analytical lenses, each of which focuses on an important aspect of human activity: *motivational* (why?), *instrumental* (what?) and *operational* (how?). At the motivational level, we ask why the user engages in the activity, and why the artifact mediates in particular ways. On the human side, motivational orientation includes the human's purpose for participating in the activity and their desired outcome. On the artifact side, motivational aspects include the values and intended purposes embedded in the artifact through its design, i.e. what kind of user the artifact expects. At the instrumental level, we are interested in goals, repeated patterns of use, the actions that define how an activity proceeds from moment to moment. We ask what the human is doing, and what the artifact enables them to do. At the operational level, we are interested in physical and cognitive capabilities, tacit knowledge, affordances, and highly routinized skills. We ask how the human meets their instrumental goals in different situations and how the artifact provides conditions for acting. The operational level can be further subdivided into the level of learned handling and physical-cognitive adaptation. These refer, respectively, to highly routinized skills such as reading and to physical and cognitive constraints such as visual acuity.

The basic way to apply the HAM analytically is by using the diagram in Figure 2 to organize collected data about a concrete mediated activity across the hierarchical levels, orienting basis, and mediating aspects. Following this, one can annotate the model further to highlight key connections and tensions between human and artifact, as well as dynamic qualities of the activity. Bødker and Klokmose present the HAM and exemplify different applications in [18, 20].

2.5 Our theoretical synthesis: an activity-theoretical description of GM creativity

Our theoretical approach to investigating GM practices integrates theories of TRPG play, collaborative improvisation, and activity theory. We use the theory of artifact-mediated activity as the connective tissue between the more domain-specific theories. This theoretical synthesis enables and structures our investigation of the role of artifact mediation in GMs' creative improvisation.

We consider performance creativity and distributed creativity highly compatible with activity-theoretical HCI[1]. Similar to other forms of improvisational performance, TRPG play constructs an emergent through a conversation that spans narrative, ludic, and social frames [24, pp. 94–105]. GMs and players execute creative entailments by contributing to the conversation across those frames, e.g. asking questions such as "what do you do?" and inventing answers. Parts of this emergent have a life beyond the bounds of a single play session, in the minds of the GM and players. For example, over the course of a campaign, GMs and players develop their ideas of their characters, the world they inhabit, and

[1]In fact, Sawyer draws on activity theory in his description of collaborative, improvisational performance, alongside pragmatist analysis [53, pp. 173–174]. For discussions of similarities and distinctions among activity theory, distributed cognition, and pragmatism, see [6, 49, 58]

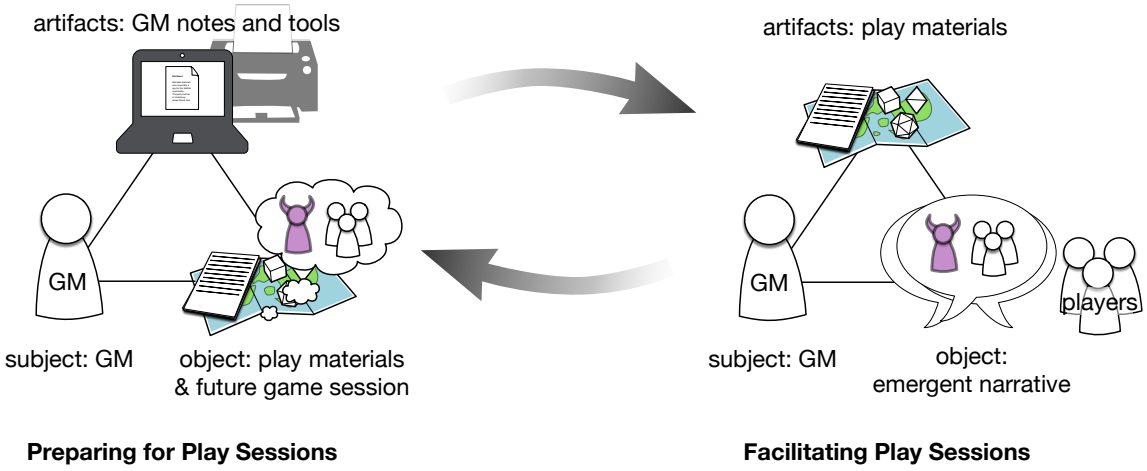

Fig. 3. We view GMing as two inter-connected activities. Each triangle represents an activity consisting of an acting subject, the object toward which they are acting, and the artifact(s) that mediates the activity [8, pp. 298–300]. When preparing for a session (left), GMs use personal tools such as word processors and web browsers to generate and develop ideas, some of which are externalized in play materials such as notes and maps. When facilitating a session (right), these play materials step into the role of artifacts, which mediate creative entailments toward the emergent narrative by GMs and players. These two activities form a cycle (center) involving distributed creativity, in which GMs and players iteratively create and develop both play materials and elements of the shared emergent such as characters and storylines.

the events that have taken place in their story so far. These developing ideas then help them ideate about what might happen next.

We understand play sessions and GM preparation as connected activities (figure 3). Play sessions are joint activities in which the object is the shared emergent, and artifacts include game rules and representations used by the GM and players. GM preparation is a solitary activity in which the object is the framing and content of future sessions, which are externalized in the materials GMs prepare. We hypothesize that GMs prepare and draw on readymades to support their improvisation and facilitation. We reflect on our theoretical approach in relation to existing research into CSTs in section 5.2.

Some RPG scholars have investigated TRPGs and related games with a focus on artifacts of play. In particular we see a connection between our study and RPG studies research that applies materialist analytical methods, which are reviewed in [10]. Dormans applies concepts from game studies to describe how TRPG rules shape play and how players choose games whose rules are conducive to the kinds of stories they want to create [26]. Carter et al. analyze the role of physical dice as mediators in a tactical wargame, arguing that dice have several salient qualities for players that resist remediation into digital forms [22]. Bienia applies Actor-Network Theory to describe TRPG play as a network of relations connecting players with objects like maps, character sheets, and tables [9]. Similar to us, these scholars all characterize how role players enact play *through* concrete objects which shape the experience, and are connected to motivation, goals, and physical conditions. However, these works study the relationship between the material and experiential qualities of TRPG play, while we are interested in how GMs actively and skillfully manipulate those experiential qualities by leveraging artifacts such as game rules, maps, and dice.

Id	Interview	Session Types	Game Systems
P1	in-person	one-shots, campaigns	Legend of the Five Rings
P2	in-person	one-shots	Cypher, Savage Worlds
P3	in-person	campaigns	D&D 2e, 3.5e, 5e
P4	remote	campaigns	Cypher
P5	remote	one-shots	Fate, Engel, D&D 5e, homebrew systems
P6	remote	campaigns, one-shots	D&D 5e
P7	remote	campaigns	D&D 2e, 5e
P8	remote	campaigns	D&D 5e

Table 1. Participants and the session types and game systems that we discussed. TRPGs can take the form of a continuing, open-ended "campaign" that occurs over multiple sessions of play, or as "one-shots", which are intended to start and conclude in a single session.

3 METHOD

We conducted a qualitative study of GM practices through a combination of in-person and remote interviews.

3.1 Participants

We recruited eight GMs (Table 1). We decided to focus on expert GMs who have well-established practices and toolsets for preparing and facilitating games. Therefore we exclusively recruited participants who had multiple years of experience as GMs, and self-described as experts. We spoke almost exclusively about participants' experience with co-located play, except with P8, with whom we talked about his shift from mainly co-located to mainly geographically distributed play mediated by online platforms. The GMs were recruited through a survey questionnaire posted on a local TRPG Facebook group, followed by snowball sampling, as well as through personal connections.

We did not have a pre-established heuristic for when to stop recruiting participants. Once we had recruited eight participants we had already conducted the first few interviews, and based on the content of those we evaluated that eight interviews would leave us with qualitative data of sufficient breadth and depth for our study.

3.2 Procedure

We conducted eight individual interviews. We used Mackay's [45] variation of Flanagan's critical incident interview technique [32], in which we ask participants to recount recent and memorable experiences, and elicit further responses by asking about related and contrasting experiences. This technique favors detailed descriptions of specific situations over global statements about general use, grounding participants in their experiences rather than asking them to speak generally about their practice.

Interviews were semi-structured. We started by asking each participant to describe the most recent play session they facilitated, then their preparatory activities for that session, and from there solicited further details or more stories by asking about similar and contrasting experiences. We steered the conversation to uncover details about the tools and representations used by the GM and other players. Before the interviews, we asked participants to have their GMing tools and materials ready, so that they could show us examples that related to the questions, or trigger new questions by showing us tools they considered interesting or unusual. We conducted three interviews in person (P1-3) and the other five remotely using Skype (P4-8). Interviews lasted 75–105 minutes.

3.3 Data Collection

For in-person sessions, we recorded audio of the interview using a mobile phone. One researcher used a DSLR camera to capture photographs and video of artifacts presented by participants. For remote sessions, video and audio of the conversation were recorded using Open Broadcaster Software (OBS). We failed to record P7's interview due to a software issue. The two interviewers immediately noted down discussions they remembered from this interview. Those notes were then combined and categorized by topic. We collected 11.5 hours of audio. From in-person sessions, we collected 54 video clips and 46 photos from in-person interviews. We collected 6 hours of video from Skype. Interviews were carried out between June 2017 and October 2018.

3.4 Data Analysis

We transcribed interviews, noting non-verbal interjections in brackets and removing pauses and false starts for clarity.

The goal of our analysis was to describe how GMs use material and communicative artifacts to prepare and facilitate role-playing games. In other words, we wanted to understand how these artifacts mediate GMs' actions towards the objects of their activity, which are future games and ongoing play sessions. We did not consider it realistic to do a complete human-artifact model analysis of every unique artifact mentioned in our data set, and therefore chose a pragmatic approach in which we applied the model to analyze both in breadth and in depth. First, we identified the set of artifacts used by GMs by collecting all mentions of personal use of external mediators (such as paper notebooks and computer applications) in a spreadsheet. We found 152 instances of artifacts. We combined artifacts that were common among multiple participants into a list of 61 distinct artifacts. We generated a list of common mediating aspects of GM artifacts based on this list. We then worked through the list, highlighting both examples of artifacts that exemplified each aspect, and artifacts that did not do so. Through this process we narrowed down the mediating aspects that we felt were salient throughout the majority of the corpus of artifacts, and merged redundant or overly similar characteristics. Second, we characterized each GM's personal practice in terms of their orienting basis at the three levels of activity (Section 2.4). The output of this activity was a set of bullet point summaries highlighting key motivational, instrumental, and operational orientations of each participants' GMing practice. This was used to get a sense of the critical tasks of GMing, the macro- and micro-interactions through which they enact their creative practice. Third, we did eight in-depth human-artifact model analyses of concrete artifacts used by each GM. We chose artifacts from the interviews that were associated with one or more detailed stories and seemed either characteristic of or exceptional in relation to the complete set of artifacts. We prepared key quotes and summaries of how the artifact was used, and then used this as the starting point for filling in the human-artifact model diagram. The output of this activity was a more detailed picture of the relationships among multiple artifacts, their different material forms, and their use over the course of multiple phases of prep and play. As our coverage of the material increased, we returned to the outputs of previous analytical steps and revised them to use consistent language and highlight key similar and contrasting examples across the data set. We report on key results in section 4.

4 FINDINGS

We present our findings. First, we provide a high-level characterization of the creative praxes of the eight participants. Then, we extend the notion of readymades into *readymade artifacts*, with examples of salient properties and key variations. Finally, we summarize our key findings.

4.1 GMs as creative practitioners

Our analysis reveals similarities and differences in how our participants creatively facilitate play, engage in preparation activities, exhibit style and identity, and make use of tools and materials.

4.1.1 Creative facilitation. We find that our participants have built up repertoires of tools and techniques to structure and advance the emergent conversation that constitutes TRPGs play. From the GM's perspective, these conversations can be understood as series of creative problems to solve, or interactions to facilitate.

The fundamental recurring interaction reflected in the stories participants told is that players ask a question or make an action statement, and the GM responds by describing the fictional world and making it react. Participants describe using a number of techniques to generate appropriate responses, such as consulting their plans and representations of the fictional world, thinking through the established fictional scene and determining the likely outcome, applying a game rule such as calling for a dice roll to resolve an action, and improvising new content on the spot. They describe selecting among possible responses by choosing an outcome that is realistic or logical within the established fictional world, or a dramatic one, or a funny one, or thinking of several options and picking one at random. These moment-to-moment creative tactics are examples of GM operations, i.e. actions that GMs have routinized to the point that they can execute them transparently during facilitation. Operations are internalized over time, and thus reflect the creative habits and preferences of GMs.

We observe key differences in the challenges that GMs highlight in these recurring interactions, which reflect their motivations and key creative techniques. For example, all participants spoke about their relationship to improvising unplanned content. Some described it as their preferred mode of creative entailment, either because they are particularly comfortable with improvising (P1, P6) or because they are interested in creating player-directed stories (P1, P4). Others describe feeling anxious about improvising when players stray too far from the planned story (P5, P7). Participants use facilitation techniques and draw on prepared materials in accordance with these preferences: P1 camouflages when he is drawing on prepared plans, making it seem as if everything is improvised to avoid forcing players toward certain outcomes; while P3 is subtle about improvisations, making it seem as if everything is planned to create a narrative that feels smooth and *"real"*. P5 and P7 sometimes use *"railroading"* techniques that constrain the actions of players towards a prepared direction, to ensure that players follow planned narratives and avoid elaborate improvisation.

Participants described other challenging aspects of facilitating play, such as keeping players informed, making them excited, managing the dramatic pacing and momentum of the narrative, and maintaining players' attention. Many mentioned personal techniques to actively manage these aspects of the play experience, such as verbally nudging players, introducing new narrative elements, changing scenes, and handing out shared physical materials such as maps.

Participants proactively distinguished themselves in terms of their personal style and identity as GMs. When describing their ideal sessions and memorable moments from past sessions, participants invoked certain experiential qualities. These included making the play experience dramatic and thrilling (P3), emotional (P6), challenging and dangerous (P3, P8), surprising and interesting (P3, P4, P5), funny and entertaining (P6, P7), motivating (P8), immersive (P1, P6), and logical and cohesive (P5). These high-level goals are indicative of participants' motivational orientation toward GMing and what they believe TRPGs are *about* as a whole. Although different participants emphasized different desired experiences, we find our data unsuitable for systematically distinguishing GMs according to these preferences.

4.1.2 Prep activities. All participants report doing preparatory activities, or *prep*, between play sessions. In practice, prep covers a diverse set of activities, including writing down ideas for interesting events or plot hooks, figuring out

main checkpoints in the narrative, identifying locations that players might visit, detailing those locations including identities of non-player characters (NPCs), collecting images to share with players, writing fiction, and composing music playlists. These prep activities produce various artifacts intended for use during play, such as maps to help players understand space and NPC traits to help GMs role-play. Participants distinguish between exploratory prep or "pre-prep", where they are working on ideas that are not connected to a particular future session, and prep for campaigns or sessions, where they are working toward concrete planned sessions. Artifacts created during pre-prep tend towards loosely structured notes and collections of inspirational materials, whereas artifacts created during session prep are often more carefully edited and structured. We found the same type of activities, e.g. writing notes on public transportation or searching for images online, were used both as exploratory prep and session prep. The amount of time spent prepping varied by GM, from only an hour or two before play to four to five times the expected length of a play session.

4.1.3 GM tools and materials. GMs use a mixture of physical and digital tools to support their creative practices. Physical tools include paper (e.g. blank, laminated, decorative, printed), notebooks, scrapbooks, post-it notes, books (e.g. official manuals and inspiring fiction), hand-drawn illustrations and maps, a laminating machine, printers, GM screens, folders, boxes, and food. Digital tools include word processors, slide presentations, custom scripts, image editing software, publishing and layout design software, music players, video games, search engines, content aggregation platforms (e.g. tumblr, DeviantArt, Wikipedia), file sharing platforms, and associated documents and media.

GMs become highly familiar with these tools through frequent use, allowing them to work transparently with them [2]. For instance, the word processors used by P5 and P6 seamlessly disappear behind their concrete objects of activity, such as descriptions of characters and locations, and P3 and P6 describe having clear mental models of their game manuals, allowing them to smoothly consult them during prep and play.

4.2 Artifact-mediated improvisation with readymades

We anticipated that, like other improvisational performers, GMs prepare and draw on readymades—reusable, prepared units of improvisation. We find that many artifacts used by GMs fulfill the role of readymades. Therefore, we introduce the concept of *readymade artifacts*, readymades with material forms, physical or digital, that during play mediate creative entailment (e.g. improvising the name of an NPC), and during prep, mediate activity towards future play (e.g. writing down potential plot points in a notebook). Different mediating aspects are activated in these roles, and in some cases, readymade artifacts are given different materializations entirely as they transition from prep to play. Figure 4 illustrates the life cycle of a readymade artifact with an example: GMs prepare readymade artifacts during prep activities, giving them a digital or physical form appropriate for their facilitation needs; and during play sessions, they use the artifacts to mediate particular creative entailments, which affect the emergent narrative.

Many readymade artifacts take the form of personal representations of game phenomena (e.g. combat encounters and role-playing non-player characters). For example, P3 collects printed and hand-drawn maps laid out in grids appropriate for the tactical combat rules of D&D (Figure 5), and P6 has a set of personal templates for representing NPCs. During prep, P6 invents or develops NPCs by writing down descriptions of them in one of their Google Docs, with the length and complexity depending on the significance of the NPC. Major characters have open-ended documents describing their life stories and key personality traits, while minor characters are given a paragraph, and incidental NPCs may be given just one or two sentences describing an archetype with some flourish, e.g. *"Bara, half-orc, 12 years old, a bit bruised as if she's been in a fight recently"*. When NPCs appear during play, these descriptions help P6 role-play as the

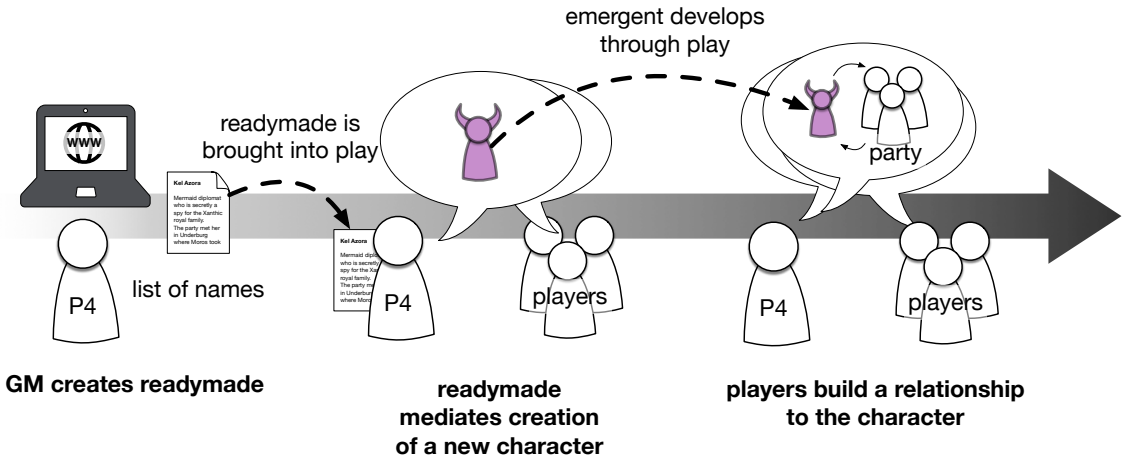

Fig. 4. The life cycle of a readymade artifact, exemplified through P4's use of name lists. P4 frequently invents new characters during play sessions as part of the collaboratively improvised narrative. He has difficulty improvising memorable and genre-appropriate names for these characters, so he will sometimes find or generate lists of appropriate names via online resources, and write them down in his notebook between sessions. When he is improvising a character, he will leaf back through his notebook and consult a list, picking a name to use or adapt. The new character enters the emergent narrative, where it may eventually become irrelevant, or may become a recurring element of the continuing story. Effectively the readymade provides P4 with a creative shortcut that supports the ordinary creative flow of collaborative improvisation that constitutes TRPG play.

NPC, using key personality traits or their history and desires, depending on NPC significance. Additionally, readymade artifacts have mediating aspects defined by their physical or digital form. For example, P3's collection of maps are either hand-drawn or printed digital files stored in a folder, so that he can bring them to to play sessions and put them in front of players to shift the story into a new location. P6's NPC templates are created in Google Docs so they can edit templates from any computer with a browser, and organize them hierarchically in Google Drive.

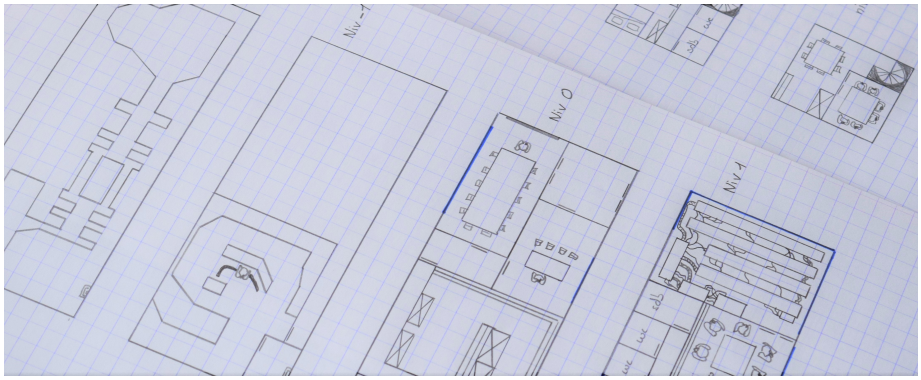

Fig. 5. Stacks of pages containing GM-drawn maps for different types of places. P3 improvises unplanned locations using these maps.

In this section we zoom in on how GMs use readymade artifacts as CSTs by describing how their mediating aspects are activated in facilitation and prep activities. We structure our reporting around the life cycle of readymade artifacts, first describing how they function in play, and then how they are produced by GMs between play sessions.

4.2.1 Readymades in play. In play, readymade artifacts mediate creative entailments by the GM and other players toward the emergent conversation consisting of the overlapping narrative, ludic, and social frames. For example, a shared map gives players a means to describe how their characters move through the fictional world, determine whether they can use their character's special abilities, and discuss their plans with the group by pointing at the map and moving around tokens on it.

All participants describe using one or more artifacts to represent the planned or potential story for a session. GMs decide how to frame a story at the outset of a session and form expectations about how players will respond to prompts, and speculate on paths they might take, because *"players never do quite what you expect, so you always try and entertain a few possibilities"* (P4). These artifacts externalize planned story elements in a form that each GM can draw on during facilitation. The diverse material representations of stories-to-be are connected to how GMs conceptualize TRPG narrative and how they navigate the tension between improvisation and planning, reacting and guiding.

Some GMs had experience using adventure modules (commercially produced books providing resources for running a particular story), such as the gothic mystery *The Curse of Strahd* [61] for D&D. P5 and P7 consciously emulated the format used by these modules in their own prepared notes, creating descriptions of characters, monsters, locations, maps, player handouts, events players can trigger, and items they can find. These modules are usually written to be consulted frequently by GMs throughout play, e.g. asking them to read out descriptions of locations when player characters (PCs) arrive there. P5 in particular carefully structures his modules to let him consult them smoothly and quickly in play. He takes advantage of Microsoft Word features to do this, writing headlines and keywords that he can quickly visually scan for or find with the search command, and formatting critical details of a scene in bold or colored text (Figure 6).

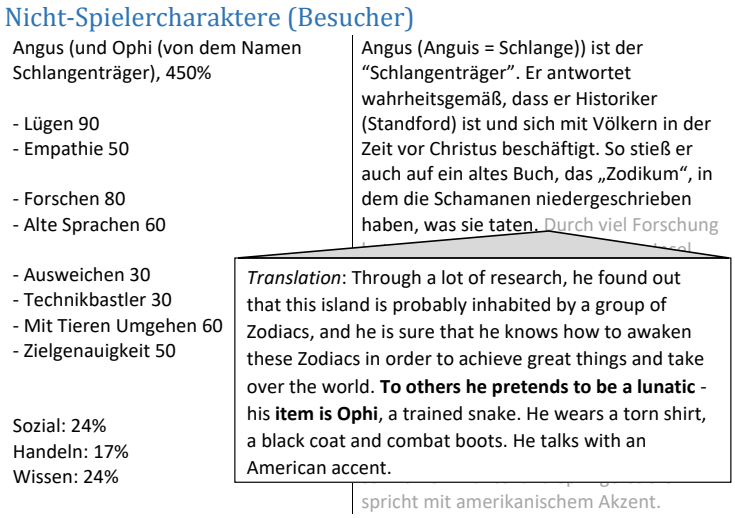

Fig. 6. P5's description of an antagonist NPC in a one-shot module written in Microsoft Word (in German). Left: game-based ability scores. Right: character motivations, partially translated to English, with bolded text as reminder on how to role-play the NPC.

However, the majority of our participants invented their own formats to suit their particular approach to prep and facilitation. P3 defines the plot for a session as a hand-written list of *"checkpoints"*, each consisting of a name describing a main scene or event of the plot. He compares using these checkpoints to giving a free-flowing digital slide presentation:

> P3: *It's like a PowerPoint presentation. Some people [read the slides one after another]. What I like to do is have slides with a title, maybe two or three points of interest, and I can talk for 10 minutes on that one slide. I kind of like to run my adventures like that.*

The checkpoints free P3 up to react spontaneously to players within each scene, while having an eye on the list and the clock so he is aware when the scene should end or he should consider skipping one of the planned checkpoints. By contrast, P6 does not explicitly prepare upcoming events or scenes, but spends their prep time developing detailed locations populated by one or more major characters with personalities and goals:

> I1: *Among all the materials you just mentioned, I didn't notice anything that tells you "what is going to happen today?", the things that you have planned for the session.*
>
> P6: [points to their head]
>
> I1: *Just in your head?*
>
> P6: *Yeah [laughs] I don't actually write that stuff down. I say "Okay, they're in Waterdeep. Something is going to happen which indicates there's a crime ring. If [players A and B] can make it today, then they're going to encounter the Emerald Enclave. If [players A and B] can't make it today, then they're going to encounter the Emerald Enclave in Iman. And uhhh, they're possibly going to get to Iman today, but that's okay, because I've got a character voice for Annika ready to go. Let's go."*

Even participants who heavily improvise draw on these artifacts as starting points for their improvisation. For example, P1 hand-writes notes for upcoming sessions that define a *"setting and conflict"* or the first act of a three-act plot. These are intended to quickly and effectively embed the PCs in the story and then *"everything else if for the players to resolve"*.

Five participants (P3, P4, P6, P7, P8) report how readymade artifacts serve to look up peripheral information during play. P4 and P6 describe keeping source material and rule books at hand during play so that they can look up information as needed. P3 and P6 use bookmarked sections of rule books to provide quick access to frequently used information. P6 and P7 find official books badly organized and favor using searchable digital copies of these books. P8 uses a community-curated web database of monsters and beasts, which he finds easier to search during computer-mediated play compared to paper books or PDF files.

Several participants described preparing readymade artifacts that help them internalize story elements such as the personalities and drives of NPCs or the tactics that a group of monsters would employ against the players. These artifacts support the establishment of readymades that are present solely in GMs' thoughts and speech, i.e. readymades as described by Sawyer and DeZutter [53, 55]. P1, P3, and P6 describe the purpose of these artifacts as freeing them up to play more reactively and focus more on the players. P6 and P7 use, respectively, free-form textual descriptions and structured character sheets to develop a sense of major characters' personalities, which lets them freely improvise when performing those characters in play. P8 develops interesting combat encounters by writing down ideas, reading manuals, and watching videos on Youtube [59]. Once in play, he relies on his knowledge of monsters' abilities and tactics to improvise their moment-to-moment actions. However, sometimes consulting these artifacts is still useful. For instance, P1 explains that the primary purpose of his session prep notes is to be internalized, but occasionally he will reference them to keep track of critical information, such as similar-sounding NPC names:

> P1: *[I look at my session notes] if I need to, yes. But these are basically notes to self, so you also learn them by heart by writing them down. So there are things, for instance when I have lists of NPC names,*

then I would definitely go back and check them, if the name is relevant. Because also in this game, names are Japanese-sounding, you can get confused, so maybe you write them down.

All participants except P5 report using artifacts to generate narrative content during prep or play to offload some of the cognitive effort required for improvising narrative, such as coming up with names for characters or what items a vendor sells. P1 uses character generators to fill in bits of the narrative world. He developed a script for generating character concepts that randomly sampled ten descriptive words from WordNet [67] (Figure 7). P3 uses online tools that aggregate individual generators to create content mashups, such as one for generating an inn, including its name, its occupants, and what items are sold there. Five participants (P1, P3, P6-8) report using random tables—an ordered collection of entries of a specific type, such as magical items or creatures, which can be selected at random by rolling dice. P8 create custom tables for improvising encounters—events with conflicts and challenges that invite players to action. P6 and P7 use tables provided by game designers to choose which loot to reward players with after an encounter.

```
 sug git(master) python sug.py
featherweight : weighs 126-139 pounds
sleeper : an unexpected achiever of success
burglar : a thief who enters a building with intent to steal
cosmologist : an astronomer who studies the evolution and space-
time relations of the universe
Cockney : a native of the east end of London
interoceptive : of or relating to interoception
amnestic;amnesic : of or relating to or caused by amnesia
earthborn : of earthly origin (as mortals are)
bleary;blear;bleary-eyed;blear-eyed : tired to the point of
exhaustion
matted : tangled in a dense mass
Ejiri { Kazuko , Okitsugu }
```

Fig. 7. Result from P1's NPC generator, which he interpreted as *"a very thin burglar who belongs to the popular class and maybe has an obsession with astronomy [...] Maybe he has gotten his head hit, and starts with amnesia."*

Participants mentioned readymade artifacts that draw players' interest and attention. Both P4 and P8 used the term *"hooks"* to describe this function: *"there needs to be some sort of hook to [an encounter]. It needs to apply to at least one of the characters in the group. And, the challenges need to apply to at least two to three of characters in the group directly"* (P8). P8 creates lists of PC hooks to help improvise engaging narratives. P8 keeps an internal list of PC flags and skills that help them improvise cues for players to act and to move the spotlight around so that all players get focus. In play, P8 uses skill checks—a game mechanic in D&D that requires players to roll a die to assess their characters' success at accomplishing a task—to invite different players into the current emergent performance. P1 describes handouts in general as having this function: *"When you have something that's embodied, it motivates players and it's as simple as that, people think it's cute. [...] You basically have to earn their attention a little bit, right?"*

4.2.2 Drawing on readymades in prep. In addition to artifacts that mediate creative entailments toward the emergent narrative in play, some readymade artifacts serve a similar function outside of play sessions. We found several examples of GMs preparing or expanding on elements of the narrative emergent as a prep activity, e.g. drawing maps or imagining characters. Some readymades serve the purpose of documenting these elements, or creating an appropriate external form for working on them. In play sessions, the narrative emergent is modified through conversation. Analogously, we

found that GMs sometimes "converse with the material" [57] by applying heuristics, speaking out loud, and otherwise engaging in what-if thinking to gradually define and detail an object. For example, P1 develops locations in an established setting by thinking through their political and geographical context, and P3 draws maps while drawing on his sense of visual balance and fantasy tropes. P5 described using writing to externalize his ideation process:

> P5: *I'm the kind of person, when I write things, it helps me to focus and to think [...] so it's not so easy for me to say "Okay, now I want to focus on the sea scene." And I'm not so productive when I only try to imagine what happened there. I need to start writing.*

P6 described running through NPC scenarios by role-playing scenes alone:

> P6: *Sometimes I get super inspired. A habit that I have, just me as a person, is pacing around and kind of running through character scenarios. And that's, my cat thinks I'm crazy because I have six different voices and I talk to all of them with each other [laughs] So if I come up with something good when I'm doing that, I sit down at my desktop and I type it up before I forget it, 'cause I know I will.*

4.2.3 How readymades are produced in prep. All participants report creating readymade artifacts during prep, whether constructed from scratch, modified from an existing readymade, or drawn from personal repositories or those of others. GMs meet artifacts and materials through their orienting basis, including their expectations, desires, past experiences, and situational goals. Their orienting basis guides their adoption and appropriation of new artifacts, as they figure out how to use novel artifacts by drawing on initial familiarity, or imagine and construct future artifacts to remediate their current use patterns.

Participants report constructing readymades from scratch during prep. P1 and P2 crafted paper puzzles for players to solve as part of one-shot sessions. P1 wrote and printed out a letter, which he cut into pieces that players needed to find and reconstruct. P2 wrote a set of computer logs which he *"corrupted"* by replacing characters at random, so that players had to decipher them. He created multiple versions of each log with different levels of corruption. The version of the log players received depended on how well they rolled a skill check.

Participants describe remixing existing materials to construct readymade artifacts, and adopting readymade artifacts available as commercial products or free online resources. P1, P2, and P5 all collect images used as part of readymade artifacts via search engines and art repositories such as DeviantArt [25]. P2 creates miniature figurines by editing characters out of images, which he prints, laminates, and mounts on small plastic stands to keep them upright. P5 uses found images as representations of fictional locations, and presents the images to players during sessions via PowerPoint decks. P4 created a unique monster by combining a bespoke description with elements of multiple monsters from official game source materials. P6 and P7 used online loot tables compiled by other players to improvise rewards for PCs when successfully completing random encounters. P2 and P5 describe gathering source materials they found interesting or valuable to use as artifacts via crowdfunded projects. Online resources tailored for GMs, such as DriveThruRPG [28], Dungeon Masters Guild [30], Dragonsfoot [27], and donjon [29], are key sources for readymade artifacts.

Participants also sourced readymade artifacts and GMing techniques from their professions and hobbies, e.g. P1 created his character generation script from programming tools he uses as a computational linguist, and P6 uses techniques from fiction-writing and improv theater, such as character questionnaires, to develop story elements.

GMs actively reflect on their artifact usage, and carry out design interventions such as finding or creating new tools to replace or extend their existing ones. In these design interventions, they exhibit awareness of trade-offs among different materializations of tools. Before he created his character generation script, P1 used multiple analog techniques

for the same task, such as randomly selecting options from a table, or drawing and interpreting tarot cards. Compared to his earlier methods, his script is personally enjoyable to use and provides improved affordances: he keeps his laptop at his side during play sessions, so the generator is constantly peripherally available, and he can generate a new character quickly with a single key press. P3 has experimented with adopting novel digital tools, such as using a web app to draw maps rather than hand-drawing them, and using an iPad app for keeping track of rule-related information about PCs. In both cases, he found that the digital tools were inferior. The map-drawing tool worked by placing standard components such as mountains and trees, which provided a uniform and high-quality aesthetic, but prevented P3 from using techniques such as drawing with more or less detail as needed. The iPad app was in practice slower to consult and edit than his usual paper PC-tracking sheet. Multiple participants reported switching from printed manuals and reference books to digital versions, i.e. PDFs and online databases (P1, P6–P8). These switches were motivated by lacking space for physical books, needing increased mobility, and finding the layout of physical books cumbersome.

4.3 Summary

We provide a real-world account of GMing as artifact-mediated improvisation, where GMs adapt and appropriate artifacts from the domain of TRPGs and beyond to serve as their personal creativity support tools. Many of these tools are readymade artifacts, prepared beforehand and used in play as improvisational aids. Many readymade artifacts externalize the narrative structures and content that GMs prepare. These artifacts enable GMs to a) prepare story elements by writing, drawing, collecting images, etc.; b) flexibly draw on those elements in play by consulting notes, leafing through maps, etc.; and c) generate entirely new content in response to players' creative entailments. We also found that readymade artifacts were used to make play sessions smooth and engaging, e.g. by allowing GMs to look up frequently referenced rules, visually represent the emergent narrative, or by reminding them how to attract the interest of particular players and characters. GMs pick materials and shape their readymade artifacts to provide desirable operational aspects (i.e. affordances), such as being able to search, skim, or go directly to frequently referenced materials, or being able to consult and modify artifacts without interrupting the flow of the game session. The readymade artifacts used by each GM are connected to their idiosyncratic style and techniques. By cultivating their repertoires of readymade artifacts, GMs reinforce their personal creative style. Their artifacts help them repeatably and consistently achieve their creative goals, e.g. exciting battles, player-guided stories, or coherent and clearly communicated puzzles. GMs act in designerly ways as they share, create, and refine their readymade artifacts: They exhibit awareness of their own strengths and weaknesses and trade-offs of different mediating aspects.

5 DISCUSSION

5.1 Implications for interaction design

We believe that our findings can support future HCI research applying emerging technologies to prototype new tools for TRPG play (section 2.2) in several ways.

Our findings have implications for selecting appropriate methods to design creativity support tools for GMs. We find that GMs actively design, share, and refine tools, and that tools are highly idiosyncratic to individual GMs. This creates both opportunities and challenges, e.g. adding a device may be disruptive to the facilitation approach of a particular GM. GMs have the lion's share of authority to determine which artifacts end up at the play table. Therefore, even designers who focus on non-GM players should pragmatically aim to design tools that GMs will want to integrate into their play

practice. These findings support using participatory design methods to collaboratively construct novel artifacts by drawing on the design knowledge of GMs and addressing the design problems that emerge in their personal practice.

We argue that the concept of readymade artifacts can be helpful for designers of creativity support tools because it is connected to creativity theories and real-world GMing practices. In these respects it follows the recommendations of Frich et al. [34]. We envision readymade artifacts as a means to start a design dialog with GMs, in which designers and GMs can ground themselves in the existing play practice and imagine interventions to it based on redesigning existing artifacts or introducing novel ones. We suggest that our concept can be applied as a generative theoretical construct [5], to drive analysis, critique, and construction activities. We have carried out preliminary exercises to test the critical and generative potential of readymade artifacts by applying the concept to three of the research prototypes we reviewed in section 2.2: WEARPG [14–16], Undercurrents [7], and Truesight Battle Grid [51]. We asked how a GM might use the prototypes in each stage and transition of the life cycle of readymade artifacts, from pre-prep or session prep, to play, to eventually being refined or shared with other GMs. Results were encouraging, as in each case we highlighted connections to values and techniques associated with readymade artifacts in our study, mediating aspects that would be in tension with the goals and needs of some GMs, and new use cases that could serve as re-design prompts. Developing readymade artifacts further as a design tool is beyond the scope of this work, but we look forward to future work in this direction.

Finally, we suspect that readymade artifacts may be a useful design aid beyond the domain of TRPGs. Domain-specific readymades are used in many different performance disciplines [53]. Additionally, improvisation is an element of many non-artistic practices, such as design and teaching. Further empirical work and design experiments may show that readymade artifacts are compatible with similar concepts from other domains. If this is the case, readymade artifacts could be a bridge to developing a Strong Concept [41], an intermediate-level theoretical construct that carries design ideas that cut across application domains.

5.2 Implications for theory

We hope that our work encourages more creativity researchers to adopt theories of tool-mediated interaction that can be used to investigate how technology shapes creativity, such as activity theory or distributed cognition [37]. We have framed GMing as artifact-mediated improvisation. Although the theoretical synthesis we develop in section 2 is specific to the domain of TRPGs and the creative genre of improvisational performance, we believe that our process can serve as a blueprint for research into other domains and aspects of creativity. Rather than understanding CSTs as novel, digital tools designed to support a specific phase of creativity such as ideation, implementation, or iteration [35], we ask how the motivational, instrumental, and operational aspects of artifacts shape and extend the action possibilities of creative practitioners. This approach helps us understand how everyday technologies are adapted as CSTs in the context of concrete users and activities [19, 21], e.g. how the search command of Microsoft Word is an important mediator when P5 facilitates game sessions. Thus, activity theory provides a research instrument for locating and analyzing CSTs among the physical and digital tools that creative practitioners in many domains already rely on, and to study how novel CSTs become integrated into real-life use.

Notably our theoretical approach does not frame digital tools as *a priori* different from physical tools. In our view, computer technologies are often misrepresented in existing creativity theories. Computer technologies are often framed either as mere adjuncts to creative practice or as completely transforming creativity, leading to "digital creativity" that is in some uniform way distinct from non-digital creativity. For example Basu and Beghetto [3] build their case study of a distributed artistic practice on an ontological separation between *"material"* and *"digital"* tools. By contrast, we find

support for Bødker and Klokmose's argument that such an ontological separation is not theoretically well-grounded or pragmatically useful [21]. Our work shows that it is not quite meaningful to envision digitally enhanced or augmented TRPGs as a distinct type of play or creative activity. Rather, like other domains of human activity, tabletop role-play is defined in part by its diverse and ever-changing ecology of artifacts consisting of both physical and digital tools. In other words, we do not see a compelling reason to consider computational CSTs essentially unlike all the other tools that creative practitioners employ in their work. Therefore, in following Frich et al.'s [34] directive to study CSTs that already exist "in the wild", we strongly recommend paying attention to those tools that do not exist inside computers or that exist across both physical and digital forms.

5.3 Limitations and future work

Our study investigates a focused subset of TRPG practice. We see at least three promising paths for expanding the empirical field to understand contemporary TRPG practice better: investigating play and players, looking beyond D&D-like games, and investigating online play and communities.

We chose to focus on GMs and use interviews, rather than speaking to non-GM players or observe actual play sessions. Interviewing players could offer a clearer picture of collaborative and distributed processes in TRPGs [55]. Observational studies of play sessions could result in more detailed data about facilitation techniques, particularly in documenting operational aspects of the activity.

GMs in our study mentioned eight different TRPG systems across interviews, though all were representative of the prototypical form codified by D&D [31, p. 6]. Although this game form is very popular[2], and our participants represent a spectrum of play styles within that form, many TRPG systems exist that avoid one or more of these characteristics. Significantly different games may well be associated with different techniques and artifacts, e.g. some games involve few or no external mediators, being played entirely through conversation.

The emergence of online communities and tools for remote play over the internet have transformed the medium of TRPGs [66, pp. 75–79]. Online communities enable players from all of the world to discuss game elements and share custom-made artifacts. Online platforms like Roll20 provide elaborate suites of tools to facilitate geographically distributed play through virtual tabletop environments. While online platforms often aim to be the sole mediator of the entire play experience, many players extend these platforms with additional digital tools that suit their specific needs for shifting among narrative, ludic, and social frames [64]. We are strongly interested in future empirical work on how online communities create and share artifacts, and the techniques and challenges of GMing online.

Our analytical focus has been on how artifacts act as reusable units of improvisation. We also found that participants created artifacts that did not directly mediate improvisations, such as artifacts whose primary purpose was to convey particular aesthetics. For example, P1 showed us several "*mise-en-scène*" artifacts, such as hand-made folders for player sheets made from joss paper, whose appearance and texture connect players to the East Asian fantasy setting of his games. We suggest there is a direction for future work in investigating how mise-en-scène factors into artifact-mediated creativity, whether in GMing or other creative domains.

6 CONCLUSION

Our work on tabletop role-playing game masters contributes to Frich et al.'s [34] research agenda for creativity support tools in several ways. We identify a range of CSTs used by GMs that we call *readymade artifacts*, which are prepared

[2]For example, Roll20 [52], a popular platform for distributed play, tracks the use of different game systems on their service. As of their latest report [60], D&D 5e accounts for 53.7% of games played

between sessions, and used to mediate creative entailments in play. GMs cultivate personal repertoires of readymades by creating them from scratch, adopting commercially produced or community-curated tools, and remixing found materials. They exhibit designerly thinking such as experimenting with tools and being conscious of trade-offs among mediating aspects. We report on how readymade artifacts mediate GM tasks such as improvising narrative elements, facilitating smooth play, and creating particular aesthetic effects. We develop a theoretical synthesis combining performance and distributed creativity [53, 55] with the human-artifact model [18] to analyze technologically mediated improvisational creativity. We have shown how the activity-theoretical notion of artifact mediation can be used to expand on models that describe individual or collective creative production. We suggest that similar theoretical syntheses may be useful in other domains of creative practice. Finally, we argue that readymade artifacts can be adapted as a design aid for future research into novel CSTs. We propose that the concept supports design by helping designers ground themselves in concrete existing practices, and can serve as a tool for GMs and designers to collaboratively analyze, critique, and construct artifacts.

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