Bad News: An Experiment in Computationally Assisted Performance

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Abstract. Dreams of the prospect of computational narrative suggest a future of deeply interactive, generative, and personalized fictional experiences that engage our empathy, curiosity, and sense of responsibility. But the gulf between our current moment and that future is vast. How do we begin to bridge that divide now, both for learning more specifics of these potentials and to create experiences today that can have some of their impact on audiences? We present *Bad News*, which uses a combination of theatrical performance practices, computational support, and Wizard-of-Oz interaction techniques. Together, these allow for rich, real-time interaction with a procedurally generated story world. We believe our approach is one that could enable other research groups to explore similar territory—and that the resulting experience is engaging and affecting in ways that help strengthen the case for our envisioned futures and also makes the case for trying to field such experiences today (e.g., in experimental theater or location-based entertainment contexts). *Bad News* is a realized game enjoyed by players with varying degrees of performance experience, and won the Innovative Game Design track of the 2016 ACM Conference on Human Factors in Computing Systems (CHI) Student Game Competition.

Keywords: Deep Simulation · Talk of the Town · Live Performance · Mixed Reality · Emergent Narrative · Wizard-of-Oz Techniques

1 Introduction

Bad News is an award-winning experimental game that combines social simulation and live performance. Players are placed in a procedurally generated town with over a century of simulated history, and the bulk of gameplay consists of players engaging in actual conversation with NPCs performed by an improvisational actor. As the player moves about the town, the underlying simulation is updated via live-coding by a wizard, hidden out of the player's sight—the experience remains improvisational. Generating a fresh town for every playthrough ensures novelty for the player, actor, and wizard. It also enables a degree of internal consistency to the town's history, and produces it at a rate, that would be difficult for a human author to match. Players explore these towns with the goal of informing one specific resident of a recent death of a family member.

By creating a game that asks players to honestly engage with death and see its consequences, some challenges emerge. As Marie Laure-Ryan points out [21]

in a critique of Murray's Hamlet on the Holodeck [17], the "interactor would have to be out of their mind [...] to want to submit themselves to the fate of a heroine who commits suicide as the result of a love affair turned bad." We want to create a space in which players are able to explore and interact with these themes in a first-person context, but to be able to do so safely.

As such, *Bad News* is an attempt to provide players with a safe space to roleplay mature themes. Rather than assume the guise of a Hamlet, Oedipus, or Anna Karenina, the player instead assumes the mantle of another classic literary role: the messenger [3]. By assuming this role, the player still walks among the lives of the non-player characters she interacts with while retaining a personal distance. The actor has the means to adjust the tone of the experience in real time, based on the responses from the player. If a player is resisting the intended somber tone, the actor can seamlessly adjust the experience to be more lighthearted; focusing less on the consequences of death, and more on the small absurdities, wonders, and sorrows that make life so rich.

What results is an experience in which players interact with a deeply simulated virtual world that is capable of adapting itself in real time to the actions of the player. We believe that the combination of a simulation, a live actor, and Wizard-of-Oz interaction techniques employed by *Bad News* is a useful one for developing and testing technologies that will enable future fictional experiences that are deeply interactive, generative, and personalized [15]. This is a mode of research, and a design space, that has only been preliminarily explored [8]. Moreover, we believe that the artifacts created by this mode of research can be effective works of interactive storytelling in their own right; *Bad News* began its life as a means to prototype integrating generative systems into a purely digital experience, but we discovered through playtests that players found the experience of *Bad News* to be engaging in and of itself.

Bad News has been officially performed at two venues: the 2015 Experimental AI in Games workshop, and the 2016 ACM Conference on Human Factors in Computing Systems (CHI), where it won the Innovative Game Design track in the Student Game Competition. Our design, particularly the framing and premise of the game, evolved between these performances. Unless otherwise noted, descriptions refer to the game's most recent form, as it was presented at CHI. In this paper, we describe the project with a particular focus on the player experience and the peculiar considerations of being an actor in this space.

2 Related Work

As an exploration of interactive drama utilizing live performance with directorial intervention, we connect this work to *The Bus Station*, an early Oz Project experiment that placed players among improvisational actors in a tense scenario managed by a hidden director [12]. This piece was intended in part to prototype a computational experience, and *Bad News* was actually born from similar motivations [1]. As a more recent antecedent, *AR Façade* was a gallery installation that deployed *Façade* in an *augmented reality* environment, with human operators intervening live to guide its reactive-planning ecosystem [8]. *Bad News*

carries its torch in exploring the potential of mixing human and machine control in amateur live performance. More recently still, Dietrich Squinkifer's *Coffee: A Misunderstanding* is a computationally assisted interactive play in which participants from the audience act out characters by performing dialogue and choreography selected by other human players [7]. Though *Bad News* is not performed in front of an audience, we still situate it in the emerging area of *computationally assisted experimental theatre* [14]. Broadly, the interplay of embodied conversation and deep simulation makes *Bad News* an example of a mixed-reality game [4]. Beyond work in computational media, our approach has been influenced by Wizard-of-Oz techniques developed in human-computer interaction research [6].

In as much as *Bad News* is a game involving computationally assisted storytelling, it shares a heritage with experiences like Jason Rohrer's *Sleep is Death* [19]. However, while *Sleep is Death* provides a canvas rife with evocative characters, settings, and props to inspire storytelling, there is no internal simulation representing the characters' backstories and relationships; all narrative responsibilities are solely the purview of the players. *Bad News* similarly leverages human capacity for storytelling, but augments it with a deeply modeled world for the players to explore and interact with.

At the 2012 Dagstuhl gathering on Artificial and Computational Intelligence in Games, the Computational Narrative working group named "systems that generate tailored story-based support for face-to-face role playing used in corporate training and simulation" as a valuable short-term research direction [13]. We believe that *Bad News* is a major step along this trajectory. Though the worlds that it generates are currently not tailored specifically to the player, they are generated from scratch and one could imagine parameterization to build towns specifically for the needs of a given player. Similarly, *Bad News* is not intended for corporate training (besides, perhaps, for a very specific profession, see Section 5.2), though the underlying technology could easily be used as such with a different diegetic framing.

3 The Game

Bad News is a game about death, death notification, and everyday life, combining deep social simulation and live performance.

3.1 The Premise

The player is cast in the role of a county mortician's assistant, brought to a small American town in 1979 to investigate and identify an unidentified dead body, hereafter referred to as 'the deceased'. The player's character has never been to this town before; the only person they know is their mentor, the county mortician himself. However, before the investigation can begin, the mortician reveals that a crisis the next town over requires his attention, and that the player will need to handle this job on her own. Namely, the player will need to identify the deceased, ascertain the name and location of the deceased's next

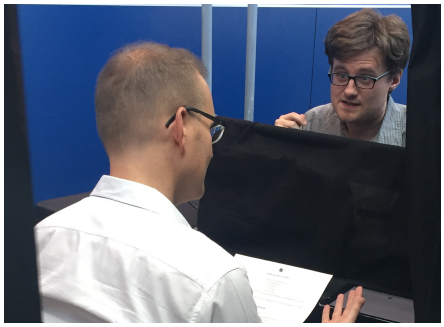

Fig. 1. A player and the actor during gameplay.

of kin, and then meet with the next of kin to deliver the eponymous bad news. Before leaving, the mortician assists the player in brainstorming a cover story for herself, one that will ideally enable her to easily gather information from townsfolk without raising suspicions that a death has occurred.

The game ends as soon as the player divulges that there has been a death in the town: victory if the person notified is the next of kin or loss if not. This is to encourage the player to seriously investigate the town; revealing the death indiscriminately lessens the dramatic build up to the final reveal, which we want to be a meaningful, intentional experience. In descending order of legal familial closeness, a character's next of kin in this town is their spouse, parent, child, sibling, and then any member of their extended family.

3.2 The Physical Setup

Though the digital component of *Bad News* is vital, the game also combines live performance, so we now discuss the physical setup. The player and actor sit at opposite ends of a table, though a *model theatre* with closed curtains obstructs their view of each other. When the player interacts with an NPC portrayed by the actor, the actor draws the curtain to reveal himself; when the conversation concludes, the actor closes the curtain to reinforce that either the actor's character or the player's character left the scene.

The player is given a notebook and pen, as well as an electronic tablet that displays game state information, such as her current location and the people that she can see. The actor has a laptop that has the actor's interface (see Section 6.2), providing insight into the characters that he will be portraying. The design of the model theatre prevents the player from seeing the actor's laptop.

Ideally, *Bad News* is played in a quiet, darkened room, in which the player's attention is permitted to focus solely on the act of playing. The tone of any given run-through of *Bad News* can vary greatly, and the atmosphere in which it is played seems to play a large hand in this variance; well lit spaces tend to yield playthroughs with less emotional weight behind the actions of the player, which is antithetical to our goals.

4 The Simulation

Before gameplay begins, a town is simulated using the *Talk of the Town* AI framework. Although a full description of this system is found in [2], a brief overview of its processes will aid the reader's understanding of its use in *Bad News*. Each town in *Bad News* is created by simulating one hundred and forty years of history, which takes roughly five minutes. Each day of this simulation is split into two time steps: day and night. Characters in this simulation are modeled for their appearances and personalities (using the famous five-factor model [5]). At each time step, characters will make decisions about where to go based on their personality, their social and family networks, and their daily routine (which may take them to work, on errands, or to places of leisure). If multiple characters are in the same location (say, two characters are running errands at the same store, or two characters are students at the same school), there is a chance that they will communicate with each other.

This communication between characters facilitates the passing of knowledge from one character to another. Characters will tell each other about themselves and about others in their lives by sharing specific details that they know. These details might pertain to occupations (e.g., revealing that someone is a cashier at a pharmacy), addresses, physical descriptions, or familial connections. However, as time advances in the simulation, characters' confidence values in their knowledge begins to wane if it isn't continually reinforced; thus, for example, friends who have had a falling out will slowly begin to forget the details of the other's life. As this happens, characters may unknowingly spread false information by telling facts that they are no longer confident about, or that were once true but have now changed without their knowledge. Moreover, based on personality traits, characters may lie to one another by intentionally spreading information that they believe to be incorrect. After nearly a century and a half of this simulation, characters build up a comprehensive—though occasionally factually inaccurate—view of the town that they live in and the people that populate it.

The player is placed in one of these towns. Though the town may be fictional, an important design goal of *Bad News* was to make it *a game about real life*. The player interacts with run-of-the-mill people living in a small American town. They have jobs, families, and friends. They run errands. They have leisure time at neighbors' houses, or they unwind at the bar. By simulating over a century of history, these characters end up with rich connections throughout the town that are brought to light through player interaction (see Section 5) and actor performance (see Section 6). Thus, part of the joy of the experience of playing *Bad News* is discovering the inherent wonder in the seemingly mundane lives of these simulated characters.

4.1 The Wizard

Though the bulk of simulation occurs before play begins, there is one important figure of the town whose actions must be simulated throughout gameplay: the player. To this end, the game employs a wizard sitting out of the sight of the

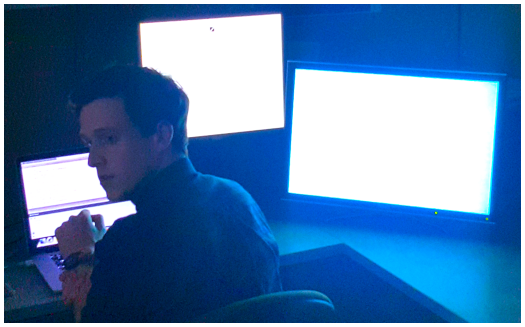

Fig. 2. The wizard sits behind the scenes, live-coding modifications to the simulation and sending information to the actor.

player who listens to the vocal commands of the player and updates the simulation accordingly. Thus, every time the user travels to a new location, the wizard relocates the player's avatar from one part of town to another via live-coding. Similarly, other actions afforded to the player (see Section 5.1) are enabled by the wizard making live updates. Additionally, the wizard queries the simulation throughout gameplay to search for narrative intrigue and potential dramatic nuggets that may be nestled in all its accumulated data. These nuggets can then be delivered to the actor over a direct line of communication (an instant-messaging service). This relationship is explored in more detail in Section 6.3.

5 The Player

The ideal player of *Bad News* is open to engaging in improvisational role play. It has been well recognized that not everyone views themselves as, or even wants to be, an improvisational actor [9]. However, the trappings of performance and narrative reside within the very fabric of our being [11, 16]. Roleplaying has the ability to be profoundly transformational [18], but accessing personal memories around the sensitive subject of death can place players in a vulnerable, uncomfortable state of being [22]. Our goal in creating *Bad News* is to give players the capacity to tailor the emotional depths reached to their own comfort levels; the actor will read the cues established by the player—including their use of language and tone of voice, their body posture, and the backstory they fabricate for the character they choose to assume—and attempt to match that energy. See Section 6 for more information on the actor's process.

5.1 The Priming Process: The Guide

Bad News begins with an extra-diegetic guide who leads the player to their seat. The guide eases the player into the world of the game, explains the premise and their role as a mortician's assistant, hands them a journal and pen to take notes, and describes what actions the player can take. These actions include beginning a conversation with an NPC in the same room as the player, looking at the city

residential directory (which displays each residential address and the last name of the family that lives there), looking at the city business directory (which displays the address and name of every place of business, including restaurants, schools, hospitals, etc.), traveling to a specific address or business name directly, or, in traditional IF fashion, moving in the cardinal directions relative to their current position. Players can also knock on doors, buzz apartments through an intercom system, and enter and exit buildings. Finally, players can advance the game's simple day-night cycle by choosing to "wait." Doing so causes the simulation to continue; all of the NPCs of the town will go about their lives—going to work, returning home, running errands, and sharing information (see Section 4).

5.2 The Priming Process: The Mortician

Once the player seats herself at the table, the guide instructs her to say that she is ready to have a conversation with the mortician. Next, the actor opens the curtain as the mortician, greets the player as his assistant, quickly explains that he will have to leave soon, and directs the player to notify the deceased's next of kin on her own. Before he leaves, the mortician asks the player to only reveal the death to the next of kin, so as not to cause undue shock to the town and to respectfully allow the family to choose how to share the news of their loss. The player and mortician collaborate to weave a convincing cover story to justify the player approaching strangers and asking them questions. By diegetically framing the player as a mortician's assistant, but giving her the opportunity to develop an additional role on top of this, we found that players had enough narrative scaffolding to feel comfortable exploring the town, while still retaining enough creative freedom that their characters truly belonged to them.

5.3 The Moment of Truth

Once the player has discerned the identity and location of the next of kin, she must let that character know of the deceased's passing. Our hope is that by exploring the town and meeting its residents, players will have a mental picture of the deceased's life, and will develop empathy for those the deceased left behind. Consequently, we aim for the reveal of this passing to be the emotional peak of the experience; though there has been a range in how players treat this significant moment, all have been respectful and civil. One observed behavior is the inclination to make the next of kin as comfortable as possible before the reveal. This can be as simple as asking the next of kin to take a seat; sometimes it involves asking them to go somewhere private. Some players have had noticeable hitches in their voices as they deliver the news, stumbling over the words as they struggle for how to break the news of the death of a loved one.

6 The Actor

As previously mentioned, all of the non-player characters in the town are played by a single actor. All performances of *Bad News* to date have used the same actor—an author of this paper who has a professional performance background,

including more than ten years of improvisation experience. As discussed in Section 3.2, the actor remains out of sight until the player engages an NPC. Also hidden is a laptop that displays relevant details about the character they are actively playing and any other characters that happen to be the topic of conversation (see Section 6.2). Also on this laptop is a chat window to maintain communication with the wizard (see Section 6.3). Since the actor does not know the personality or qualities of the characters he will be playing until moments before assuming that character, the actor must learn to parse the interface quickly.

6.1 An Actor Prepares

The most important thing an actor can do for themselves prior to a *Bad News* performance is familiarize themselves with the Big Five personality traits (extroversion, agreeableness, neuroticism, conscientiousness, and openness to experience) [5]. These serve as a convenient brush to broadly paint the shape of a character. Although real values $[-1, 1]$, these are split into five partitions for ease of access for the actor. Other key characteristics, e.g., age, gender, and occupation, also contribute heavily to the actor's physical and vocal choices.

Though the actor remains seated the entire time, characters still express themselves through physicality. A low-extroversion or high-neuroticism character might hunch over in their chair, cross their arms, or otherwise posture themselves as small and guarded as possible. Highly agreeable characters might stick out their chest or lean in toward the player to demonstrate that they are a friend. A low-neuroticism, low-agreeableness character might comfortably lean back in the chair, unreservedly conveying disinterest in the player and their search.

Similarly, strong vocal choices convey character. Volume is an easy vocal quality to modulate based on personality—for example, low-extroversion characters tend to be more soft-spoken. Openness to experience can impact the nature of words used; characters with low openness employ a simpler vocabulary. The location of the conversation impacts the character's demeanor as well. A highly conscientious character at work is likely to be professional and guide the conversation assuming the player is a patron needing to be assisted, even if the character happens to have unsocial traits such as low extroversion or low agreeableness; elsewhere that same character might act differently.

Though these personality traits assist the actor in quickly assuming a character, the actor must still fill in the details that lead to a memorable, believable, distinct character during performance. These details are determined through character-specific decisions made during conversation, through observed attitudes toward others characters in the town, and through insights provided via chat with the wizard. These details make the character feel like they are flesh and blood; the actor is allowed to invent these details as they see fit, so long as they build upon facts established by the simulation and do not contradict it in any way. For instance, during one playthrough, the player encountered a painter at a construction company eating lunch at a diner. During this conversation, the character revealed his aspirations for moving to New York and striking up a career as an independent artist, dreams not present in the simulation.

6.2 The Actor Interface

Displayed via a hidden laptop, the interface is divided into three parts: information about the character the actor is currently playing, information pertaining to another character that is the topic of conversation, and "match" information. The currently played role fills in once the player initiates conversation with a character. It has information regrading their personality, profession, age, gender, marital status, physical appearance, and their reason for being at the current location (work, errands, leisure, etc.) Details about how the actor translates that information into performance are described above in Section 6.1.

The second section, regarding the subject of conversation, is populated with data whenever the conversation veers toward a specific character. It consists of everything the character currently being performed knows about this other character, as well as how they feel about them. Since characters can get facts wrong about each other (see Section 4), next to every belief is a confidence rating. Characters can have accurate information but not be confident about it, and conversely can be supremely confident in information that is wrong. There can also be gaps; e.g., a character might have no idea where another character works. The actor takes this into account and can choose how upfront they are about their uncertainty.

The final section contains a list of "matches;" after the player asks a broad question (e.g., "do you know anyone who is blond with a scar?"), it will be populated with every person the character knows that matches the query. This section of the actor interface is also maintained as part of the wizard's live-coding responsibilities.

6.3 Peeking Behind the Curtain

When not updating the simulation, the wizard has time to explore the history of the town and the interweaving relationships of its denizens. When he unearths narratively interesting tidbits, he communicates them to the actor via a chat window. This relates to the *story recognition* challenge of emergent narrative [20]. Sometimes even small things, such as a date, can deeply inform character behavior. For example, if the wizard sees that the character has a child whose birthday is coming up, it can inform both the demeanor of the character (happy, harried, etc.), and provide justifications to their simulated behaviors.

Often the information is more complex, involving the relationships of multiple characters. In one playthrough the player was visiting the store where the deceased worked. The wizard was able to discover that the deceased had very high mutual attraction for one of the store's cashiers. Moreover, the cashier was significantly older than the deceased and already married, but his spouse was harboring romantic feelings for a coworker of her own. This manifested when the player spoke to a mutual acquaintance of the cashier and the deceased: a gossipy teenager who insinuated that the cashier, unhappy in his home life, had been flirting with the deceased. This scandalous behavior provided a bit of drama in

these characters' lives, but also cued the player that, for more information about the deceased, the player might do well to speak to her crush.

Just as the actor can "invent" justifications and motivations as long as they build off of information established by the simulation, the wizard may do so as well, and communicate that to the actor. Thus, though the actor has the unique responsibility of determining how information about the world is revealed to the player via performance, the information itself is unearthed and developed by the actor and the wizard working in tandem.

7 Sample Playthrough Summary

To give the reader a sense of the general progression of a game of *Bad News*, we include a summary of an actual playthrough. We remind the reader that every playthrough of *Bad News* involves a uniquely generated world; the characters and their relationships and histories in this playthrough were never seen before, nor will they ever be seen again.

After speaking with the mortician in the game's introduction, the player left the deceased's apartment and checked the residential directory to quickly ascertain the last name of the deceased. From there, he found a janitor in the apartment complex, and asked the janitor if he knew the deceased by name or anyone matching the deceased's description. The janitor confessed that he did not know any of the tenants, but suggested that the player go to a nearby delicatessen, which was a popular hot spot in town.

The player went and found it to be crowded. Observing the characters in the deli, he sought out someone with similar features to the deceased. As it turned out, he managed to find the deceased's aunt—the sister of the deceased's father—who in fact had inherited the same physical features of the deceased by virtue of their common ancestry. The aunt was open-minded enough to not mind sharing her table with a stranger, and after the two exchanged introductions and the player learned the aunt's surname (which was the same as the deceased's), he knew he was on the right track. He explained he was a historian chronicling the history of the town, hoping she would tell him more about her family, and ultimately her next of kin. The aunt obliged, telling familial history that reinforced the game's theme of loss: her father had been a town blacksmith for forty years of life, but as the march of progress advanced and demand for blacksmiths all but disappeared, her father lost his smithy and—after decades of being a skilled artisan—had to find work as a stocker at a grocery store, until he passed away. (Intriguingly, this was an artifact of the underlying simulation's modeling of industrial progress, which makes smithies likely to shut down in the period after World War II.) The player sympathized with the aunt, and asked if there were other members of her family he could speak to.

Feeling connected with the player after sharing her family history, the aunt told the player that her brother is a janitor at a nearby department store, whose shift was ending soon. The player thanked the aunt for her time, and rushed to the department store. The player entered the store after hours, and a manager

there irately approached him. As the player was being ushered out, he spotted the janitor, who was best friends with the manager. The player struck up a conversation with him, which the manager begrudgingly allowed. It became clear that the janitor was the deceased's father, and therefore his next of kin. Out of respect for the father's privacy, the player did not want to reveal the death with the boss glaring at him. The player offered to meet the father at a bar when he was done with his shift, which he agreed to.

At the bar, the player quickly got into an altercation with the bartender, who viewed the player as childish. Before a fight broke out, the father arrived. The player then asked him to take a seat, somberly revealed his true profession as a mortician's assistant, and respectfully informed the father of his son's passing.

8 Preliminary Results and Critical Reception

Our results are derived from postmortems with the approximately 30 players we've had, and through our own observations of players as they play. The most striking observation is how quickly players ease themselves into the roleplaying aspect of the experience. Many players expressed discomfort, most often about lacking training in improvisation, before playing—and sometimes during play at the beginning. However, as play progressed, players stopped verbalizing these discomforts, and began showing investment in the role (thinking aloud about the town, who to talk to next, and about what they've learned so far).

Perhaps the most assuring piece of feedback we've received is that many players have expressed that the experience feels very unique—both by virtue of the fact that this is a gameplay experience unlike most others, but also because the player has free reign to explore a town with hundreds of characters in any way that they choose. Thus players report feeling high senses of agency over the shape of their gameplay session. Players have said that they felt *transported* to the world [10], and were able to readily visualize the people that they spoke with and the places that they visited. Many players found their towns so vibrant that they were shocked to learn during the postmortem that the towns were generated and not designed by hand. This suggests a promising use of this framework—and the technology that powers it—in future applications of games and stories to enable high senses of player ownership over their narratives.

In addition to positive player interviews, *Bad News* has received positive critical attention as well, winning the Innovative Game Design track of the 2016 CHI conference Student Game Competition.

In summary, *Bad News*' unique combination of live performance and simulation appears to have the potential to be a powerful new form of storytelling. The ability to generate towns with hundreds of NPCs with interconnected histories and relationships in a matter of minutes is fertile ground for rich emergent narrative. The open-ended framing of the game enables players to carve their own path through the story, determining which locations and characters in the town become narratively significant. The casting of the player as a specific character that must develop a cover story simultaneously provides the player with

firm scaffolding to build on with the flexibility to diegetically shift their identity, possibly multiple times in a single play session, lessening some of the vulnerability inherent in role playing. This facilitates somber, respectful engagement with mature themes in a first-person context. We sincerely hope that *Bad News* is the first of many pieces of its kind.

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