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Articles

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Raising the Curtain on a Visual Novel Prototype

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Introduction

The year 1984 was the setting of Orwell's dystopian novel as well as the year the Apple Macintosh debuted with its legendary Super Bowl advertisement.^[1] It was also the year following the video game crash of 1983. Much has been written about the macro view of the event, of companies caught up in—and consumed by—this crash, yet very little captures the toll that the crash took on people working in the video game industry at the time. For these individuals, it would have been little consolation that this crash was not a global phenomenon or that it was not even the first market crash in the video game industry.^[2] This is the backdrop for the story of how two game-industry veterans found themselves in 1984 creating a prototype of what would now be called a visual novel.

The protagonists of this story are Dona Bailey and Paul Allen Newell. Bailey is perhaps best known for two things in the context of video games: first, her work in the design and development of Atari's *Centipede* (1981, with Ed Logg), which had become one of the highest-earning arcade games by 1982.^[3] Bailey was new to games, but not a neophyte developer, and had a background in low-level programming that serendipitously involved writing code for the same 6502 CPU that later drove *Centipede*.^[4] Second, Bailey is known for her trailblazing presence as a woman in the early video game industry. She was unabashedly characterized in a 1982 article as “apparently the only woman who designs coin-operated games in the United States today,” but the male-dominated workplace at Atari eventually took a negative toll.^[5] She escaped the environment at Atari by moving to Videa, which was followed by a lateral move to Pizza Time Theatre (headed by Atari cofounder Nolan Bushnell). This positioned her to get caught up in the massive layoffs at Pizza Time Theatre that preceded its bankruptcy filing, a layoff process so chaotic that Bailey herself had to go ask Bushnell if she was laid off—they had forgotten to tell her!

Meanwhile, Newell had started his career with a master's degree in fine arts, specializing in experimental video and computer animation. He had multiple games to his credit by 1984, including *Towering Inferno* (1982) for the Atari 2600, along with a related critical contribution to *Entombed* (1982) and a 1982 port of the arcade game *Scramble* to the vector-based Vectrex console. His last endeavor, in 1983, was the ambitious LaserDisc-based arcade game *Cube Quest*; unfortunately, the game was not successful,^[6] the start-up company producing *Cube Quest* dissolved, and in 1984 Newell was looking for video game work at the worst possible time. It was thus through a combination of misfortunes that Bailey and Newell separately found themselves looking for new opportunities in a tight market, and Activision threw them a lifeline.

Now, forty years on, we think of Activision (currently Activision Blizzard, purchased by Microsoft in 2023) as having been a game-industry juggernaut. In 1984, however, Activision was a relatively young company. It had been started in 1979 by four programmers from Atari, namely David Crane, Larry Kaplan, Alan Miller, and Bob Whitehead, who were also dissatisfied with the Atari environment albeit for markedly different reasons than would spark Bailey's future departure.^[7] Their new company prospered, and in the 1982–83 year alone, Activision logged over USD\$157 million in net sales.^[8] Activision hired Bailey and Newell from May through December 1984 with a short series of consecutive contracts to perform “a feasibility study with regard to an interactive image and word entertainment software project” entitled “Computer Theatre.”^[9] In this arrangement, Bailey was the *Computer Theatre* designer, and Newell was the self-described “fingers on keyboard,” the programmer whose job it was to realize Bailey's vision. Interestingly, though, the idea for *Computer Theatre* did not originate with Bailey.

Bailey and Newell dealt with a variety of people during their short stint contracting for Activision, with Newell in his programming role only privy to a subset of the meetings. The director at Activision who initiated the project was the one who gave them the idea for *Computer Theatre*; at her first meeting with him, Bailey was in the unusual situation where the director was pitching the idea to her, rather than the other way around. Although this director strongly advocated for the project as a result, the project did not remain under his purview; Bailey recalls the second director they interacted with as “curious” about *Computer Theatre* but not “super supportive.” One constant figure throughout Bailey and Newell's interactions with Activision was Allison (Elwers) Hale, who transitioned during that time from being an assistant to the senior vice president of editorial development into the product-development administration manager. Her involvement was apropos, perhaps: Bailey remembers Hale fondly as being “upscale” and “as improbable in the [game] industry as the guy's [first director's] ideas seemed.”

What “improbable” thing did Bailey and Newell design and build a prototype of, amid this cast of characters? The answer comes from an interdisciplinary combination of game history, computer science, anthropology, and archaeology.

Methodology

Archaeology is a discipline that studies the past (broadly interpreted) via material culture or the physical remains/products of cultural activities and human agency. Archaeogaming, in turn, is “the archaeology both in and of digital games”; however, it is by necessity an interdisciplinary field of study.^[10] The archaeological record for video games includes digital artifacts that can often only be recovered and accessed using the

techniques of computer science, which can also provide insight into the technologies and processes of game development. The field of game history documents and analyzes the cultural and historical contexts in which games were developed, and anthropological perspectives on culture change, agency, and technological organization can explore and enhance the field.

The use of the term *archaeology* immediately evokes the field of media archaeology, where a great deal of work has been done, up to and including the creation of extensive laboratories where scholars can directly engage with historical technology.^[11] By contrast, archaeogaming is a relative newcomer originating slightly over a decade ago.^[12] It is helpful to return to Erkki Huhtamo and Jussi Parikka's characterization of media archaeology to understand the difference. They wrote that "media archaeology should not be confused with archaeology as a discipline," and further that it was free "to roam across the landscape of the humanities and social sciences and occasionally to leap into the arts."^[13] Interestingly, the combination means that they have seemingly disregarded not only the discipline of archaeology but also computer science and engineering. Archaeogaming, while a new subarea, provides a conduit through which we can inclusively bring long-standing work in both archaeology and computer science to bear on game history; our methodology can thus be seen as complementary to media archaeology yet not contained within it.

Our primary source of information about the prototype comes from our two players: Bailey and Newell. Newell had retained a selection of materials from the *Computer Theatre* project, including personal financial records and correspondence with Activision and Bailey, handwritten working notes, twenty-one 5.25-inch floppy disks, and twenty-six printouts on fanfold paper. We had the floppy-disk data professionally extracted, which yielded 262 files that contained various versions of the *Computer Theatre* assembly-language source code, development programs, and documents. For the printouts, some of which were delicate and at risk of falling apart, we created digital copies through scanning and digital photography; and, where printouts were hard to read because of severely faded ink, we applied custom image processing to make them legible again. All artifacts were cataloged; references to specific artifacts here are labeled with descriptors in anticipation of donating the assemblage to a museum once this work is complete and the items are made accessible to others. *Assemblage* is an archaeological term that, in this case, refers to the collection of *Computer Theatre* artifacts.

To understand the process of and context around the development of this prototype, we undertook interviews with Bailey and Newell to capture their recollections about its history. We acknowledge that our own biases and research agendas constrained the interview questions; correspondingly, the interviews were informal and loosely structured with open-ended questions. This parallels the foundational work of Janet Spector who sought to "personalise the past, to find and express empathy and feelings for people and objects revealed via archaeological investigation, and, most of all, to resist representing the past through detached, distanced, and objective forms of writing."^[14] This is also why Bailey and Newell are coauthors on this publication; following James Clifford and George Marcus's critique of ethnographic writing, we are challenging established modes of writing that embody and privilege a single, academic authorial voice, ensuring our informants have agency, that their intellectual labor and contributions to this work are formally acknowledged, and that their perspectives, recollections, narratives, and experiences are intentionally and holistically centered following Patrick Lee (et al.) and Allison Mickel.^[15] This type of collaboration can be seen as the "coproduction" of knowledge.^[16]

While there are some limitations to collecting and using oral histories and interviews, including imperfect or selective memory, having direct access to the individuals responsible for the artifacts provides a unique opportunity to gain insight into the process of development, their technological and design choices, and the broader cultural context of game implementation at this critical time and place in video game history.^[17] Interviews allow us to capture information and knowledge that might have been lost through the digital decay but also bring to life the networks of assemblages—a form of deep engagement Shawn Graham refers to as enchantment.^[18]

Bailey and Newell gave informed consent to participate in this research, and interviews were undertaken in accordance with the protocol submitted to and approved by MacEwan University's Research Ethics Board (REB file no. 102076). Two informal, structured interviews were conducted virtually via Zoom in February 2023; these were recorded (both video and audio), from which transcripts were made. The first interview focused broadly on capturing the creation of the materials under study, while the second interview involved the presentation of a playthrough of the resurrected game to Bailey and Newell. The backstory above is based on these interviews and other email communications with Bailey and Newell. All quotes contained herein are from the two interviews unless otherwise stated.^[19]

In the assemblage, meanwhile, general practices of computer use and knowledge sharing are already apparent via a cursory look at these artifacts. For instance, Newell wrote project-related letters and documents on the computer using what may have been the only editing program at his disposal, the one bundled with the *Merlin Pro* assembly-language development environment that Activision provided. Newell prefaced each line of text in these files with an asterisk, forcing the *Merlin Pro* editor to treat the lines as free-form code comments and ignore the English prose within them.^[20] Most interesting of all in the assemblage, of course, was the preserved source code for *Computer Theatre*.

Computer Theatre : The World Premiere

One of the foremost questions we had, upon initially learning of Newell's saved artifacts, was whether or not *Computer Theatre* could be made to run again. This turned out to be easier than anticipated, thanks to Newell's careful documentation from nearly forty years prior. The *Computer Theatre* prototype was contractually required to run on the Commodore 64 home computer, a machine Commodore touted as "the world's top selling microcomputer" in 1984.^[21]



Emulator screenshot of the *Computer Theatre* title screen (Courtesy of authors)

The *Computer Theatre* title screen is shown in figure 2. Bailey and Newell agree that the concept was intended as an “interactive play” or “theater” rather than a traditional video game, and with that framing, the title of the prototype’s theatrical performance was *Holding Things Together*. This was not the original title, and in fact the John Lennon quote on the title screen was an in-joke: Bailey’s preferred title was *Making Other Plans*, and Newell—with an eye to remaining employed during the industry downturn—said “I don’t think we should tell the company that there’s the option of making other plans.”

The title screen was probably Bailey’s design because a comment Newell wrote in the source code says that “the following loads the title page with whatever Dona dreams up.” It is mostly static, with two dynamic elements. The bottom line of text is a horizontally scrolling marquee, showing the authors as well as the Activision logo and the copyright date of “19&4 [*sic*].” The center top of the screen shows the other animated component, what appears to be a randomly falling raindrop or teardrop at first, but there are hard-to-spot feet(?) underneath the drop, and the source code clarifies it as an “egg drop.” Newell says this was demonstrative “eye candy” for anyone viewing the demo, as the first thing they would have seen in *Computer Theatre*.

Figure 3



Emulator screenshot of the chapter selection page, with #2 (Cathy) highlighted (Courtesy of authors)

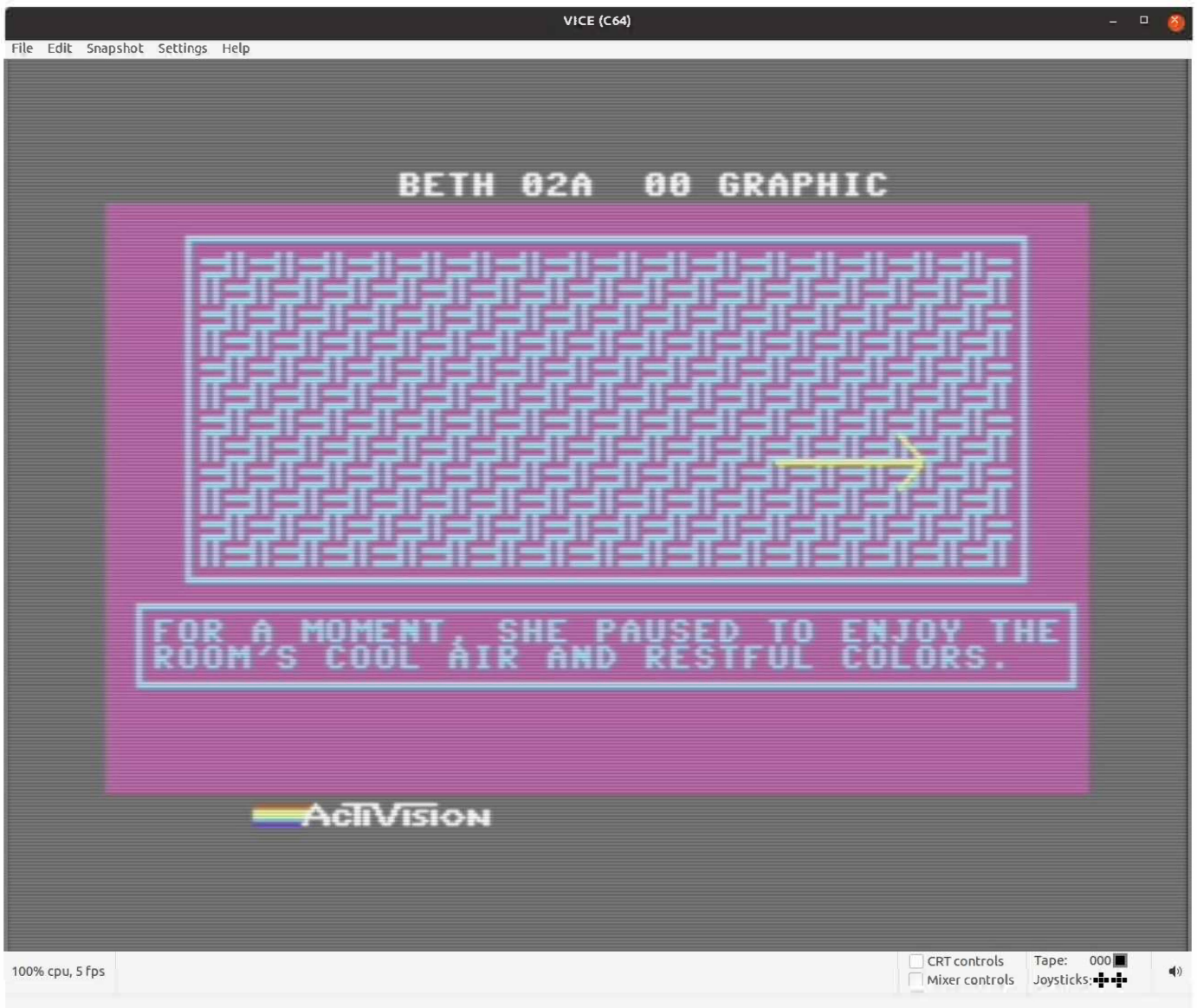
From the title screen, the player advances to the chapter selection screen (fig. 3), where each chapter would tell a portion of the overall story from a certain character’s perspective. The intent, based on surviving documents, was that “chapters may be read in any order; because they are not arranged chronologically, they need not be read sequentially,” and *Computer Theatre* automatically maintained an independent bookmark for each chapter.^[23] The characters’ stories were intertwined, and they were deliberately told differently to explore the design space and show off the prototype’s technical features. The character Beth offers a text-heavy third-person perspective; Cathy relies more on graphical pages with less text; and Kent is told through the conceit of a “Bachelor of the Year” magazine article.^[24]

Figure 4



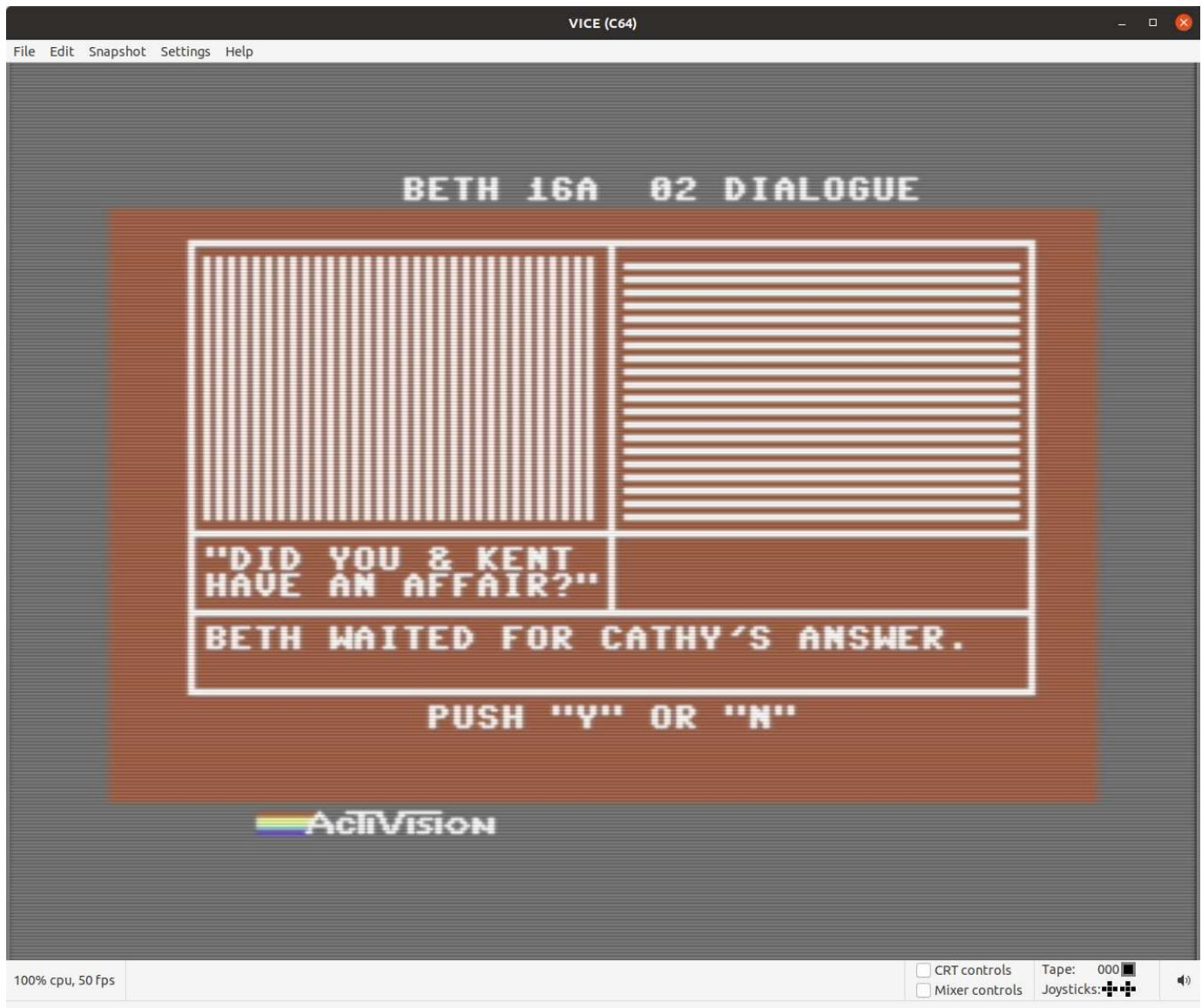
Emulator screenshot of a sample text page from *Computer Theatre* (Courtesy of authors)

Figure 5



Emulator screenshot of a sample graphic page from *Computer Theatre* (Courtesy of authors)

Figure 6



Emulator screenshot of a sample dialogue page from *Computer Theatre* (Courtesy of authors)

The individual pages of the story within each chapter are one of three types, as shown in figures 4, 5, and 6, and a given chapter could combine any of the types. A text page was simply a wall of (all uppercase) text that, at least in the prototype, had longer passages manually formatted to be fully justified. Graphic pages were called “theater graphics” in one design document, and *Computer Theatre* had placeholders for the graphic images that were to appear there; graphics were not attempted in the prototype, as neither Bailey nor Newell was a professional graphic artist. Bailey *had* created some crude colored-pencil sketches (now lost) that she had shown to Allison Hale at Activision, but graphics were seen as something that an artist would add later. Finally, dialogue pages would juxtapose two smaller images and, judging by the extant pages, were meant for character–character interactions. Audio and animation effects were deployed in a somewhat haphazard fashion throughout the prototype to illustrate what was possible with the program. For example, the arrow atop the graphic page in figure 5 was moving across the screen from left to right.

The primary page navigation consisted of the ability to linearly step forward and backward through the pages of a chapter in sequence, and the player could jump back to the chapter-selection page to start or resume reading a different chapter. More interesting was that not all the content was located within the linear sequences: “secret pages” offered bonus content, and the player had a different set of keys they could use to uncover these.^[25] Some pages, like the one in figure 6, offered branching choice points that allowed players to control the narrative in limited ways, an idea that Bailey credits to Hale. While there were antecedents to this interactive narrative idea, the clearest influence was the *Choose Your Own Adventure* books that enjoyed some mainstream popularity at that time.^[26] Using the navigation controls to step backward permitted the player to revisit selections they had made earlier, but the real impact of player choices was in *Computer Theatre*’s writing,

Decades after the fact, Bailey recalls little of the writing aside from drawing inspiration from Ann Beattie’s *New Yorker* stories, although some small parts do stand out. The character of Beth, for example, was named for a childhood friend of Bailey’s, and a characterization of personal relationships as like being “in the cocktail-shaker of love” was an expression that Bailey herself used. What she remembers clearly, however, is the challenge of writing a story where the reader/player could jump around. How could the story be kept narratively consistent with the choices the player had made? There was not much guidance in terms of contemporary video games apart from text-adventure/interactive-fiction games, although their tracking of game state and its effect on the story was typically implemented using a much more heavyweight

mechanism, like Infocom's Z-machine.^[27] Effectively the conceptual jumping-around problems Bailey had stumbled across were those of writing a rudimentary form of narrative hypertext, albeit years before hypertext worked its way into popular consciousness with Apple's HyperCard and the World Wide Web, and trying to take an early step toward what Janet Murray would later call a multiform story.^[28]

Ultimately, the biggest hurdle Bailey and Newell had, given the short period of time Activision gave them to develop *Computer Theatre*, was technical rather than narrative. The targeted Commodore 64 had 64 KiB of random-access memory but, more importantly, its single-sided disks held a meager 170 KiB.^[29] That disk space would have needed to hold the *Computer Theatre* code in addition to the story's data, and that restricted the length and complexity of the tales that could be told. The written assessment they provided to Activision in the end relegated the idea—at least on the Commodore 64—to children's stories:

"The C64 does not have the storage capacity needed for an adult-oriented project of this sort. Some other system, such as an IBM PC or an Apple MacIntosh [sic], seems more suited to an adult interactive novel.

The C64 seems more useful for a text-related interactive children's game. This kind of project could be more graphics-oriented with a smaller amount of text used to tell the story."^[30]

Computer Theatre as Visual Novel

To shed light on *Computer Theatre*'s design in the context of contemporary entertainment software, an introduction to the key components of the visual novel genre is necessary. We should first point out that the term *visual novel* (VN) was not in use when Bailey and Newell worked on their *Computer Theatre* prototype. This generic label emerged in 1996 with the release of Leaf's *Shizuku* exclusively in Japan, and the label was meant to distinguish it from a previous series presented as "sound novels."^[31] However, computer-based novel/game hybrids developed much earlier, often presented as branching narratives with a focus on textual elements, a flexible amount of multimedia assets, and some ludic elements from minigames to the integration of hidden endings. The genre is documented by a growing community on the Visual Novel Database (VNDB), which currently integrates more than 49,500 titles going back to the early 1980s, many of which have not been documented extensively, with hundreds of titles from the 1980s and 1990s.^[32] Visual novels often feature erotic or pornographic elements that seem to target specific audiences (for instance, heterosexual men for *bishoujo* games, and heterosexual women for *otome*), but recent scholarship shows that they could also be related to Japanese adventure games and digital comics.^[33] The expression *visual novel* has become common for older games in the VNDB and appears in the title of Mark Kretzschmar and Sara Raffel's 2023 monograph. The retrospective application of this expression is justified in part because no other existing generic term can appropriately refer to all these games that exhibit a sort of family resemblance. It currently serves as an efficient keyword for the community working on a lesser-known and somewhat elusive game genre.

Since no work at this point has thoroughly inspected the corpus documented on VNDB, defining the main characteristics of VNs is not a simple task. Kretzschmar and Raffel highlight many specific common traits, such as storytelling alternating between internal monologues and direct dialogue, first-person visual perspective portraying the changing emotional states of characters, and interface options (for instance, "skip" and "auto") facilitating the navigation of text.^[34] However, exploring many titles included on the VNDB reveals a great diversity in terms of visual design, the complexity of the branching narrative (or lack thereof), and ludic components. This highlights that any branching narrative integrating some visual elements and ludic aspects may intersect with our contemporary understanding of the VN lineage. As Kretzschmar and Raffel note, "characters are the primary reason to play many of these games, whether dating sims, mystery, or even *ero*ge," and this central aspect of VNs can certainly be related to the branching narrative hinted at in *Computer Theatre* design documents (where paths/chapters are named directly after important characters; see fig. 3).^[35] Our contribution expands research suggesting that similar designs emerged outside of Japan during the same period.

In *Literary Gaming*, Astrid Ensslin proposes situating the vast corpus of digital objects with a strong literary focus on a spectrum: "ludic digital literature" on one end and "literary computer games" on the other.^[36] This spectrum integrates ten subtypes of digital objects featuring ludic aspects, either from a cognitive perspective (so-called readerly mental interactions with a cybertext) or directly through game mechanics, leading to so-called playerly engagement. Ensslin's organization provides a helpful way to think about VNs, even though her own corpus of "literary videogames as understood in [her] book form a subgroup of art games," and perhaps as a result, very few titles from the VNDB appear in her study.^[37] Some of the art games studied by Ensslin are defined through core features already developed during the 1980s VN lineage, however; the use of minigames essential to story progress in *Inanimate Alice* (2005–9), for example, can be seen in early VN designs. *Computer Theatre*, and its lack of overt gameplay elements like minigames, would clearly seem to fall on the readerly, more literary end of the spectrum although—as we discuss below—its design opens possibilities for playerly activity.

Ensslin associates real literariness with attempts to dialogue with literary canons (such as *Fable*'s intertextual play with Anglo-Saxon epics) or encourage readers to adopt a metafictional perspective on the text. This strong emphasis on metafiction also characterizes the hopes and aspirations seen in Anthony Niesz and Norman Holland's seminal paper on interactive fiction.^[38] Interestingly, Kretzschmar and Raffel highlight the prevalence of metafictional play in the VN lineage; while the genre is strongly associated with pop culture and *ero*ge, textual navigation mechanics prevalent in VNs can lead players toward a form of metagaming.^[39] *Computer Theatre* does indeed feature a branching narrative that could have led to multiple playthroughs, and replayability opens up to this form of metagaming. Surprisingly, metafictional play has even developed in response to the simpler branching-narrative design offered by many visual novels. One of the recent landmark titles

from the genre, *Doki Doki Literature Club!* (Team Salvato, 2017) has garnered attention for this exact reason, its troubling narrative calling into question user expectations about *bishoujo* games, relying on glitch aesthetics at key moments, and even breaking open the boundaries of the game in its famous final moments.^[40]

We can better understand the potential for metagaming and *Computer Theatre's* design by employing additional models in conjunction with Ensslin's. To orient us in the abundance of cybertexts, Marie-Laure Ryan has developed a "compass of interactivity." The cardinal directions in this compass are built from combinations of interactivity in two categories, internal-external and ontological-exploratory.^[41] Most single-player quest-based video games propose internal-ontological interactivity: actions are taken from the (internal) perspective of a game-world character, and player performance directs the fate of this game world—even when the possible outcomes are often limited to a few win-or-lose states in the end. In branching or multidirectional narratives, by contrast, players make choices in order to reach a certain state of affairs, like the seduction of a love interest. Yet many VNs offer incentives to replay the text to discover, for instance, all the images in the network acting as rewards or the so-called real ending of the story. Certain VN design elements can take users out of the internal mode: a gallery menu option featuring all the images that have been found (and consequently, those still to be found); rewind or fast-forward mechanics to navigate the text more efficiently for reaching branching points; and textual hints that another ending still needs to be uncovered. All these mechanics invite users to switch from ontological play to exploratory play as well as to navigate the graph of branching narratives until satisfying narrative closure has been reached. The oscillation between internal or external, between exploration of alternative story worlds or goal-driven reading, between the relaxed actualization of a cybertext or the complicated resolution of an adventure or strategy game, appears central in many of the most elaborated VNs.^[42] Moreover, any branching text structure can raise the idea of hidden paths or features and can thus accommodate the more playerly attitudes that have developed in the VN community.

At this point, the connection between VN design elements and the *Computer Theatre* prototype is obvious. Design documents mention the "hidden 2-D weave," that is, secret pages that can be found woven into each chapter as a kind of "bonus to the reader," echoing the dynamics of the undiscovered endings or hidden paths highlighted above. Mechanics to navigate the text from an external perspective were clearly described in these documents, most notably the left-arrow key, "useful for re-reading or for returning to a response page." The bookmark mechanic allowed players to jump back and forth between the chapter-selection page and their point of progression in each chapter; escaping the narrative flow to explore the branching structure and find additional paths or Easter eggs has become a central element in VN players' generic expectations. While *Computer Theatre* never had the opportunity to progress beyond the prototype stage, it exhibited early forms of what we would now consider to be the hallmarks of visual novels.

Discussion

Did the prototype succeed? To answer this question, we need to understand what a prototype *is*, which can be seen from the high-level, archaeological viewpoint of humans and technology as well as the more domain-specific, computer-science perspective of *Computer Theatre* as a software product.

Given that we have focused on a relatively modern technology, one might question the relevance of an archaeological perspective. Although archaeology is typically framed as the investigation of *past* human behavior, there are no temporal limitations on how the past is defined in archaeology. Archaeology not only considers the distant past but has a long tradition of applying theoretical and methodological frameworks to the recent past as well. Archaeologists are also particularly adept at studying technology. The evolution of our species is not a story told only by fossils of distant ancestors, but one told by the systematic recovery and analysis of evidence from the archaeological record—an almost four-million-year-long record largely composed of the raw materials, tools, and products of technological systems. The analysis of this record consists of collecting data to answer technological questions, while recognizing that it is culture that informs how people answered these questions; that is, technological behavior is cultural behavior, and consequently archaeological thought is also informed by anthropological studies of culture, science, and technology. Here we have chosen to utilize a theoretical framework of humans and technology from archaeology and anthropology called the *chaîne opératoire*, which has seen use in a wide variety of domains, including video game development.^[43]

Briefly, the *chaîne opératoire* is a theoretical framework used to examine and interpret the steps/stages, techniques, tools, energy, gestures, and knowledge used in a technology.^[44] This framework holistically captures the entire life history of an object as well as the complexities of human technical behaviors involved in its production. Specifically, it captures those choices made in the operational sequence from acquiring raw materials and then transforming them into usable products, to using and ultimately discarding produced objects and associated waste products.^[45] This focus on processes versus final products makes *chaîne opératoire* particularly relevant to situating *Computer Theatre* as a prototype.

Prototypes provide unique insight into the *chaîne opératoire* because of their very purpose and function. Prototypes serve as models for an intended final product, but they themselves are not a product in the sense that they are not intended for distribution to or use by the end user. Prototypes are used by and are useful for the agents involved directly in production—they can be a proof of concept, a sample of the product, or an original model from which the product is copied. However, the form, function, and style of a prototype reflect more than just technological knowledge; for example, the properties of clay (raw material) may influence the size of vessel a potter may ultimately be able to

create, but decisions around the particular vessel's shape or function or type of decoration are also made based on cultural, not just technological, knowledge. As such, prototypes provide important insights into the production sequence when other sources of information about that technology may be absent from the archaeological record, or otherwise unknown or undocumented.

From our prototype, we have been able to elucidate not only what raw materials and tools were available for use at the time of its creation, but specifically what raw material and tools (both digital and material) Newell used. Brendan Keogh argues that video game makers had “mediated and mediating agency.”^[46] What Newell could build with his raw material and tools was shaped not just by a consideration of the required mechanics, narratives, and aesthetics of the requested prototype game, or the affordances and constraints of existing tools and raw materials, but also by the culture of game development at that time and his own experiences and knowledge working with and utilizing these raw materials and tools. Following Keogh's further arguments, we should frame this agency of the maker in game creation as representing *craft*, “the learned processes and dispositions of *making* undertaken by an individual—a craftsperson—that produces artifacts that have both practical and aesthetic qualities” (emphasis in original).^[47] Learning through creation is critical here for establishing our artifact as a prototype. The progenitor of the *chaîne opératoire*, André Leroi-Gourhan, argued that the gestures and tools used are culturally specific and become “entrenched within the subconscious of the apprentice”; thus, within the *chaîne opératoire*, prototypes can be situated as a practice, one requiring skill and knowledge.^[48]

The *chaîne opératoire* provides a straightforward view of the tools and raw materials used to build the prototype. The prototype was, from a contractual view, the end product. However, through the *chaîne opératoire*, we can also see the prototype itself as raw material for a later product, where the concepts and technology (if not the exact code itself) for the prototype would have been leveraged as re-use. The *chaîne opératoire* thus applies twice here. This is the value of the archaeological perspective: archaeologists add a view of skilled and knowledgeable humans working their way through the same technological framework regardless of the materials used or the time frame of the technology, be it 2.9-million-year-old hammer stones recovered from the strata of Olduvai Gorge or forty-year-old computer code recovered from disks stored in Newell's garage.

The *chaîne opératoire* framework is based on recognizing that the choices made in a technological sequence reflect shared cultural understandings of raw material, technology, use, and discard. We can thus situate prototypes as rare and unique examples of technological practice and of the ways and modes of technological-knowledge transmission. Any engagement in technology is the result of learning that takes place in a social context because “learning the skills and transmitting those skills across space and time requires sustained social contact,” where the greater the skill necessary, the greater the amount of time needed to achieve mastery.^[49] Interestingly, while Bailey and Newell were not working on this prototype in close physical proximity to other programmers and designers, they were embedded in the larger social context of game development and they also had contacts and connections in the industry, which facilitated an alternative mode for the transmission of knowledge and information.

In terms of sharing knowledge of programming lore, for instance, the Commodore 64 was not a computer that Newell had previously programmed. He was working on the project off-site, away from the Activision offices, which limited the amount of direct programmer-to-programmer knowledge about the Commodore 64 that could be transferred. Instead, we see evidence of alternative flows of information within the artifacts. Some were physical books as was commonplace in this pre-internet period, such as Newell being loaned a *C64 Reference Manual*.^[50] More interesting are the instructional artifacts that would not have been available outside Activision: a thoroughly documented “C64 base program” by John Van Ryzin; complete, proprietary source code for “Revenge of Pitfall Harry for the C64”;^[51] and confidential Commodore 64 audio code by Tony Ngo.

We can further refine our interpretation of *Computer-Theatre-as-prototype* by taking a computer-science, software-development standpoint. Particularly for computer users who are not programmers, the external appearance of the software-development process seems linear, deliberate, and thoughtful: released software is labeled with one of a consecutive sequence of often-numbered versions. This external vantage point is frequently a facade because the software developer intentionally provides only a curated sampling, typically where they temporarily thought the software was stable (or stable enough) for public consumption. The factors that play into choosing software release points are not solely technical, either. Software development is a social, human activity that occurs in a broader ecosystem; while it is understood that software will inevitably have bugs to fix, there is also consequent risk of reputational damage if a release point is selected where the software is excessively broken.

The internal vantage point of software development is a very different experience. Programming is an extremely fluid activity, with code under development subject to frequent addition, deletion, change, relocation, and restructuring. A programmer performs the mental labor of juggling complex design requirements and interactions between parts of the software system under construction. And, at the most basic level, there is the underlying question of whether or not the software being built is even possible to construct. This latter point is where we direct our focus because this is the situation in which a prototype might be useful.

Fred Brooks's *The Mythical Man-Month* is well-known within the field of software engineering and a good starting point to understand software prototypes. First published in 1975, it contains the pithy quote “plan to throw one away; you will, anyhow.”^[52] This is a statement taken to be advice about the necessity of software prototypes, and it is explicitly called “Brooks's Law of Prototypes” in a later collection of aphorisms about computer science.^[53] The “throw away” comment is not about prototypes, however, instead referring to the choice “to build a *pileot* [software] system and throw it away” (emphasis added).^[54] Brooks does talk about prototypes, but he defines a prototype system as one

with many aspects abstracted away compared to the final system: “A prototype software system is ... not necessarily bound by the same hardware speed, size, or cost constraints.”^[55] For Brooks, prototyping software seemed more targeted to resolving issues of system design, but for what Bailey and Newell were building, space constraints were a critical concern that could not be ignored.

More contemporary thinking about software prototypes can be found in Barry Boehm’s description of a “spiral model of software development,” discussed retrospectively as “a 1985 landmark in IID publications.”^[56] “IID” stands for “iterative and incremental development,” essentially an acknowledgment that it is infeasible to create complex software from whole cloth without a progressive series of development steps. Boehm’s spiral model characterized development as a series of software prototypes that, importantly, could be used to address performance, such as the space constraints of *Computer Theatre*. More generally, Boehm frames the whole exercise as risk management, which would make sense from Activision’s corporate point of view, as they weighed the cost of bringing a new type of entertainment product to market and its potential return on investment.

The labeling of *Computer Theatre* as a pilot, a prototype, or a “feasibility study” is irrelevant, given that Activision employed Bailey and Newell to create software that would test the idea of “interactive image and word entertainment” and thereby mitigate risk for the company.^[57] Seen through Boehm’s lens of risk management, their goal was to answer two questions. First, is it possible? And second—an extra characteristic that games need to have—is it fun?^[58] Our ethnography of *Computer Theatre* through interviews with Bailey and Newell provides some answers.

Plainly, the *Computer Theatre* idea was possible to some degree, given the functional version of the program we have been able to run. The question of how far they could push the storage capacity of the Commodore 64 platform was critical, though, because it was a key limiting factor. As Newell said, “We had a real problem with text compression, which was that given the technology back then (the Commodore 64), there just wasn’t enough memory on this thing to be able to hold the amount of content that Dona wanted to have a rich game.” The suggested workaround, as we saw, was to limit *Computer Theatre* to children’s entertainment.

Technically, Newell realized that the naive text representation that worked for a prototype, with one character per 8-bit byte, was unsustainable for longer stories; for him, the entirety of the third Activision *Computer Theatre* contract was spent working on text compression, a specialty in which Newell freely admits he was not an expert.^[59] He was able to squeeze the text down to roughly half its original size, which was competitive for the time.^[60] For reference, Infocom claimed their string representation for text adventures used “about five and a half bits per visible character,” with contemporary academic compression research yielding around 2.2 bits/character but requiring overhead that would have far outstripped a Commodore 64.^[61] The size of graphic images, left as placeholders in the prototype, was never considered and may eventually have proven to be a high-priority concern as well, although by that time a number of image-compression techniques for microcomputers were well-known.^[62]

The question of fun is far more subjective. The story/ies extant within *Computer Theatre* seem compelling, and Bailey was excited about the potential of the game—she loved the concept and saw the opportunity to explore human relationships by presenting narratives in a nontraditional way. If we recast the question more playfully, *Computer Theatre* was undeniably fun, at least for Bailey and Newell. Amid layoffs and bankruptcies, they collaborated on a unique, “improbable” project with a unique dynamic. They worked from home, communicated over the phone and by physical mail, met over meals as needed, and only entered Activision offices proper to sign new contracts and provide deliverables and demos. They connected authentically and worked well together, and the toxicity and problematic culture of the game industry Bailey experienced while at Atari were not present. Their mutual respect still remains after decades of not being in contact before being brought together once again for this research.

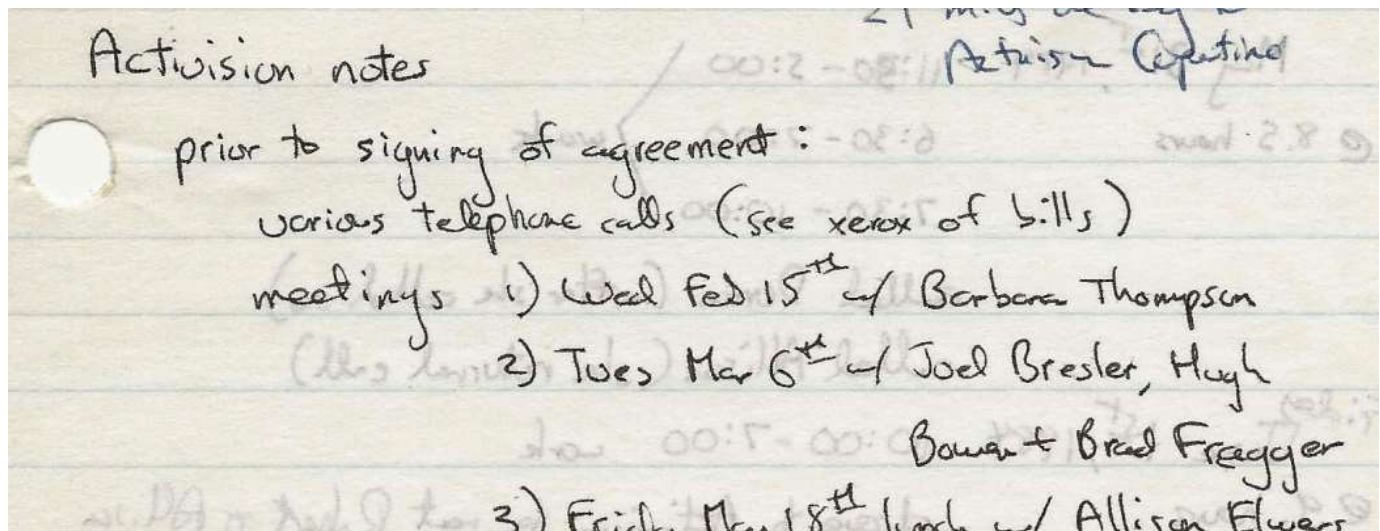
The value of an interdisciplinary perspective shines forth here—interviews conducted with an ethnoarchaeological approach capture not just the memories of informants, and the details of what, how, and why they used the raw materials or tools that they did, but also their feelings, motivations, perceptions, and reflections. Not only can we tell an interesting story, but we can capture what the experience of working on this prototype was for Bailey and Newell and give them agency and voice in disseminating the results. Furthermore, this aligns with an anthropological understanding of the subjective and situated production of knowledge.^[63] This prototype was developed by Bailey and Newell in a specific time and place, and this context cannot be dismissed, nor can we discount the value of their retrospection on the experience forty years later. An ethnoarchaeological approach centers the voices and stories of the individuals behind the digital artifact that are remnants of this early stage of the industry, thus permitting the telling of stories that are frequently absent from official or mainstream narratives of technological development and innovation.

But there is more to the story. By nature, prototypes are either further developed into fully formed products, or they are abandoned, and Activision elected to do the latter. It is perhaps fairest to say that Activision truncated *Computer Theatre*’s development, as opposed to actively canceling it; as Newell put it, “from their [Activision’s] point of view the project never really died, it just had to stop because they couldn’t do anything.” Further, he had a premonition that their work would never see the light of day: “I had to go down to Activision at the end of this thing and hand over the code and walk through everything with the [Activision] programmer, and in the back of my head, I’m kind of going: this really, really feels very much like it’s going to go on a shelf in a room and that’s it. This is just going through the motions.” The obvious reason for Activision’s decision had nothing to do with technical issues or the quality of *Computer Theatre*—it was a budget decision. The consulting contracts had provided a temporary respite for Bailey and Newell’s unemployment, but Activision’s resources were themselves finite and under stress.

The 1983 video game crash had raged on during *Computer Theatre's* performance, and Activision had already made deep cuts, "lay[ing] off more than 90 employees, one-quarter of its work force" in November 1983.^[64] The net sales of \$157 million in 1982–83 mentioned earlier were followed by stunning drops, to under \$70 million in 1983–84 and just over \$27 million in 1984–85.^[65] Activision tried to put the best face on the situation for its shareholders, euphemistically writing in their 1985 annual report that the "past year was another marked by dramatic change in the home computer and video game industries," yet unmistakably they were in a tenuous position.^[66] Long-term exploratory exercises in storytelling like *Computer Theatre* were off the table for a company in survival mode.

Or were they? In 1986, Activision released *Portal* for the Commodore 64.^[67] Brad Fregger, the Activision producer and champion of *Portal*, described it this way in his autobiography: "I got an idea that we ought to try an interactive novel. Written novels are almost always extremely linear in approach.... I wanted to try something different—a novel that could be read in many different ways, from many different paths."^[68] The idea had arisen originally from a debate Fregger had with Activision cofounder David Crane, and notably the development of *Portal* took two years and thus would have overlapped with most if not all of *Computer Theatre*.^[69] The linkage between the two projects might be considered highly speculative, were it not that Newell's saved notes mention a meeting with Fregger and others on March 6, 1984 (fig. 7),^[70] before the first *Computer Theatre* contract began, and Newell's first Activision contract's signatory was Tom Lopez—Fregger's boss and also the first director that Bailey met with who pitched the idea to her.^[71]

Figure 7



A portal to *Portal*: a 1984 meeting with Brad Fregger (Materials from Project 1, CT assemblage) (Courtesy Paul Allen Newell)

The *Portal/Computer Theatre* connection is unexpected and intriguing, and it may gesture toward the path the idea took. We are not casting aspersions on Fregger's origin story for *Portal*; the question of why Activision seems to have pursued the concept in two ways is curious, however. The endpoints of the two projects were markedly distinct in story and interface, and since Bailey and Newell worked off-site, no further cross-pollination of ideas would necessarily be expected. *Portal* neatly sidestepped the storage problem by shipping on five disk sides, three physical disks in total, which would have substantially changed the rules of engagement for *Computer Theatre* and removed their technical roadblock. A trifecta of budget constraints, redundancy, and the lack of an internal advocate at Activision would easily have spelled doom for *Computer Theatre*, though. Activision had, in fact, been Making Other Plans.

Conclusion

Given the ephemeral nature of prototypes, we have been fortunate to be able to document and study the *Computer Theatre* prototype through a rich combination of physical artifacts, digital artifacts, and the recollections of the two key people who were involved. The time period in which the development took place has also allowed us to put a human face on the fallout from the 1983 video game crash in North America as a complement to the corporate-level histories that are normally told. That this game was never finished does not determine its success because it was never meant to be finished; both Bailey and Newell recall, and it is clear from the contract with Activision, that they were tasked not with producing a final game or product but proving this type of game could be made.

While Activision's scuttling of *Computer Theatre* denied the project of any influence it may otherwise have had, we can see Bailey and Newell anticipating later narrative hypertexts and incorporating elements that position their program as an early visual novel-type of game in the North American context. We can only speculate about how engaging a commercial release of *Computer Theatre* would have been, but it is interesting to note that visual novels have become very popular beyond Japan. More generally, given the enormous, understudied quantity of visual novels—and considering their bridging of games, literature, and art—there are undoubtedly many other entries in the visual-novel genre in need of careful examination. As for *Computer Theatre*, we have been able to view it through multiple lenses, not only through game history but through computer science's notion of prototypes and the broader archaeological view of prototypes in the context of humans and technology.

The final word on *Computer Theatre* we leave to Dona Bailey, remembering the feeling she and Newell had at the time: “we were doing something that no one we knew had tried before.”

Acknowledgments

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Addendum

Further clarification regarding the authorship of this paper seems warranted since it conveys meaning in an academic context. The overarching principle is to acknowledge the labor and contributions that underlie the work we do, and thanks to the involvement of Bailey and Newell, we are presented here with a direct way to do so. Holistically speaking, Bailey and Newell have made the largest contribution to the work because it simply would not exist without their efforts on *Computer Theatre*; it just happens that this primary work was conducted some forty years ago. Historical writing privileges the creation of modern work, however, and both Bailey and Newell took part in the research for, and writing process of, this paper. As a result, their appearance as coauthors is not merely honorary—they have earned their coauthorship of this knowledge coproduction.

Footnotes

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- ⁷ ^ Alexander Smith, *They Create Worlds: The Story of the People and Companies That Shaped the Video Game Industry*, vol. 1, 1971–1982 (Boca Raton, FL: CRC Press, Taylor & Francis Group, 2020).
- ⁸ ^ *Annual Report 1985* (Activision, 1985), 12, Q-File microfiche.
- ⁹ ^ Materials from Project 1, *Computer Theatre* assemblage (hereafter CT assemblage). Briefly, we have supplied a descriptor for references to the CT assemblage that will permit others to locate the source once the assemblage is preserved in a memory institution.
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- ¹¹ ^ Darren Wershler, Lori Emerson, and Jussi Parikka, *The Lab Book: Situated Practices in Media Studies* (Minneapolis: University of Minnesota Press, 2021).

12. [^] Aris Politopoulos, Angus A. A. Mol, and Sybille Lammes, "Finding the Fun: Towards a Playful Archaeology," *Archaeological Dialogues* 30, no. 1 (2023), <https://doi-org.proxyiub.uits.iu.edu/10.1017/S1380203823000053>.
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16. [^] Sam Miles, Alicia Renedo, and Cicely Marston, "Re-Imagining Authorship Guidelines to Promote Equity in Co-Produced Academic Collaborations," *Global Public Health* 17, no. 10 (2022): 2547–59, <https://doi-org.proxyiub.uits.iu.edu/10.1080/17441692.2021.1971277>. This type of collaboration can be seen as the "co-production" of knowledge, as explained in further detail in the addendum to this paper.
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