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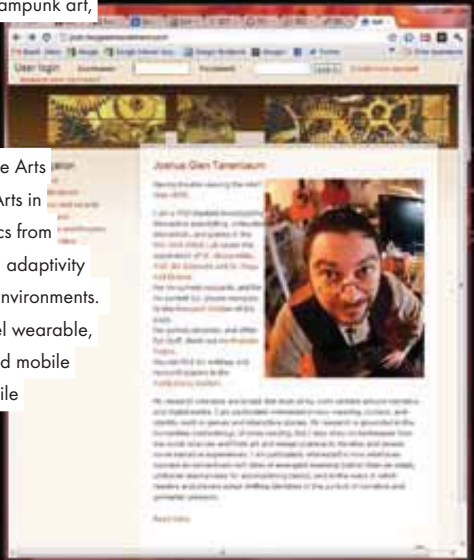
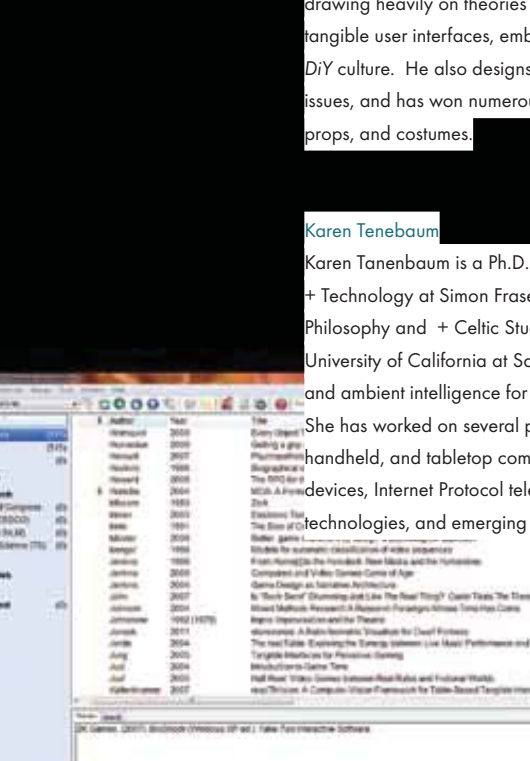
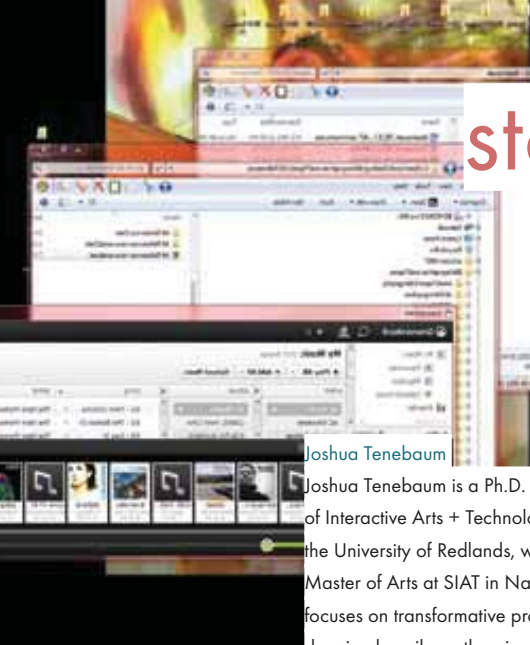
interactive digital  
storytelling, tangible user  
interfaces, electronic  
literature, user studies

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# Getting Your Hands on Electronic Literature: Exploring Tactile Fictions with the Reading Glove

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## Abstract

There is a need in interactive narrative research for a robust understanding of how readers engage with new interactive stories. This article describes The Reading Glove: a tangible interactive storytelling system that provides readers with an opportunity to physically engage with physical artifacts from the world of the story. Drawing on several theoretical traditions, we explore how digital literacy, reader expectations, and interactional context all contribute to the process of meaning making that a reader of a participatory narrative undertakes. We present three design heuristics for digital storytelling, based on our analysis of readers engaging with the Reading Glove.

# Introduction

**“Interactive narrative” is a loaded phrase that invokes different dreams for different populations of people.** For new media theorists like Janet Murray<sup>1</sup> and Brenda<sup>2</sup> Laurel, it elicits visions of participatory stories enacted within immersive simulated “holodecks.” For theorists of hypertext and interactive fiction like Jay David Bolter<sup>3</sup> and Emily Short,<sup>4</sup> it suggests branching textual environments and rhizomatic tangles of linked lexia. For researchers in computer science and AI, it has manifested in simulations of believable human characters<sup>5</sup>, and intelligent storytellers that direct the action in a simulated storyworld along desirable narrative paths<sup>6</sup>. Within the digital games community, theorists like Henry Jenkins,<sup>7</sup> Celia Pearce,<sup>8</sup> and Jim Bizzocchi<sup>9</sup> suggest broad framings of narrative that allow it to infuse and enhance gameplay. Outside of academic research, interactive narrative conjures images of “Choose Your Own Adventure” novels, role-playing games, and improvisational theater. For the purposes of this article we take a broad perspective on interactive narratives, which we view as *stories that afford active participation on the part of the reader*. We assert that a robust understanding of the experience of readers and players engaging in interactive stories is crucial to developing this new medium.

While much work has been done to explore the technological boundaries of computational narrative forms,<sup>10</sup> and extensive theory has been written about the poetics of interactive stories,<sup>11</sup> comparatively little research has been done on how readers approach narrative experiences, and how readerly expectations inform the interpretation and reception of an interactive narrative.<sup>12</sup> In this paper we describe an interactive narrative that we have designed that is experienced via a custom tangible embodied user interface called the Reading Glove. We present three important theoretical perspectives on how readers make

sense of mediated experiences and apply them as analytical lenses for viewing the experiences of participants interacting with our system.<sup>13</sup> We have previously written about the design of the technology and the interactions in this system and about the authoring process of the narrative content,<sup>14</sup> and so in this paper we will be emphasizing the ways in which readers experienced the narrative elements of the system. Our analysis of the responses of readers using the system allows us to propose three design heuristics for future interactive storytelling systems.

1. Janet Murray, *Hamlet on the Holodeck: The Future of Narrative in Cyberspace*, ed. Anonymous (Cambridge, Massachusetts: The MIT Press, 1997).
2. Brenda Laurel, *Computers as Theatre* (Boston, MA: Addison-Wesley Longman Publishing Co., Inc., 1993).
3. Jay David Bolter and Michael Joyce, “Hypertext and Creative Writing,” in *ACM Conference on Hypertext* (Chapel Hill, North Carolina, United States: ACM, 1987).
4. Emily Short and Jim Munroe, “Inside Interactive Fiction: An Interview with Emily Short,” *Gamasutra*, [http://gamasutra.com/features/20070410/munroe\\_01.shtml](http://gamasutra.com/features/20070410/munroe_01.shtml).
5. Ruth Aylett et al., “Unscripted Narrative for Affectively Driven Characters,” *IEEE Computer Graphics and Applications* 26, no. 3 (2006); Jonathan Gratch and Stacy Marsella, “Evaluating the Modeling and Use of Emotion in Virtual Humans,” in *ACM International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS '04)* (New York, New York, USA: ACM, 2004); Michael Mateas and Andrew Stern, “Facade: An Experiment in Building a Fully-Realized Interactive Drama,” in *Game Developers Conference (GDC' 03)*, Game Design Track (San Jose, CA2003).
6. Mark J. Nelson et al., “Declarative Optimization-Based Drama Management in Interactive Fiction,” *IEEE Computer Graphics and Applications* 26, no. 3 (2006); David L. Roberts and Charles L. Isbell, “Desiderata for Managers of Interactive Experiences: A Survey of Recent Advances in Drama Management,” in *First Workshop on Agent-Based Systems for Human Learning and Entertainment* (Honolulu, Hawaii: AAMAS, 2007).
7. Henry Jenkins, “Game Design as Narrative Architecture,” in *First Person: New Media as Story, Performance, and Game*, ed. Noah Wardrip-Fruin and Pat Harrigan (Cambridge, Massachusetts; London, England: MIT Press, 2004).
8. Celia Pearce, “Towards a Game Theory of Game,” in *First Person: New Media as Story, Performance, and Game*, ed. Noah Wardrip-Fruin and Pat Harrigan (Cambridge, Massachusetts; London, England: The MIT Press, 2004).
9. Jim Bizzocchi, “Games and Narrative: An Analytical Framework,” *Loading—The Journal of the Canadian Games Studies Association* 1, no. 1 (2007).

## The Reading Glove

There have been two design iterations of the Reading Glove system. The first consisted of a glove-based reader and a set of tagged objects used to access a non-linear story.<sup>15</sup> The current version adds an intelligent recommender system and tabletop display to assist interactors in navigating the narrative. In this paper, we will discuss insights gained through a preliminary analysis of the data being produced in an ongoing study of the current prototype.

## The Reading Experience

Interaction with the Reading Glove system is straightforward. The “reader” puts on the Reading Glove and begins picking up the objects sitting on the table (see Figure 1). When the palm of the glove contacts the tag on the object, a segment of recorded audio narration is played back over the speakers. Several seconds before the clip ends, the tabletop display delivers a set of recommendations on which object to pick up next by enlarging and brightening photos of the objects. The reader can choose to follow

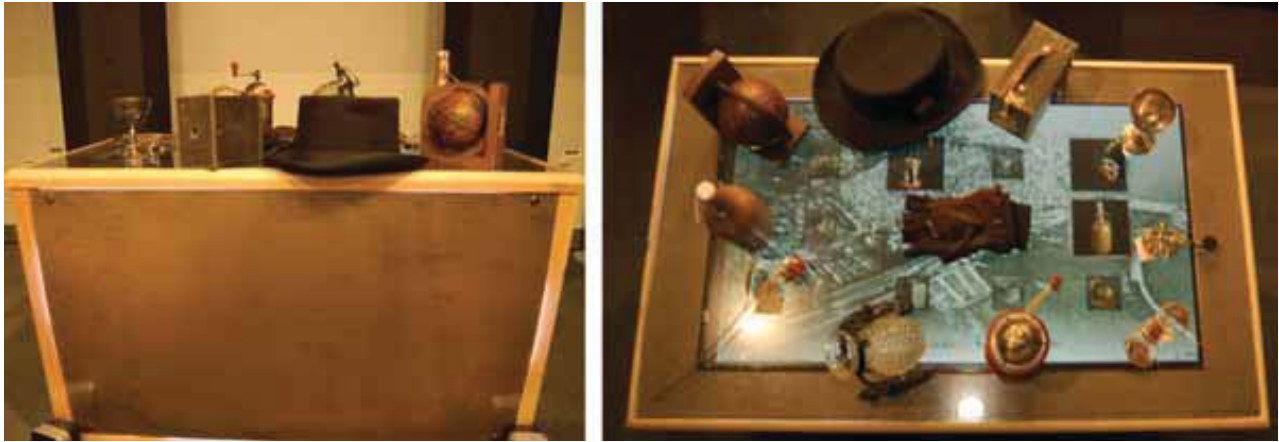


Figure 1: The Reading Glove, Tabletop, and Narrative Objects

10. Aylett et al., “Unscripted Narrative for Affectively Driven Characters.”; Marc Cavazza, Fred Charles, and Steven J. Mead, “Interactive Storytelling: From Ai Experiment to New Media” (paper presented at the International Conference on Entertainment Computing, Pittsburgh, Pennsylvania, 2003); Michael Mateas, “An Oz-Centric Review of Interactive Drama and Believable Agents,” in *Technical Report CMU* (Pittsburgh, PA: Carnegie Mellon University, 1997); Michael Mateas and Andrew Stern, “Structuring Content in the Facade Interactive Drama Architecture” (paper presented at the AAAI Conference of Artificial Intelligence and Interactive Entertainment (AIIDE ’05), 2005 2005); Mark Riedl, “Towards Integrating Ai Story Controllers and Game Engines: Reconciling World State Representations,” in *International Joint Conference on Artificial Intelligence (IJCAI) Workshop on Reasoning, Representation, and Learning in Computer Games* (Edinburgh, Scotland 2005); David Thue et al., “Interactive Storytelling: A Player Modelling Approach,” in *AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment (AIIDE ’07)* (Palo Alto, California: AAAI Press, 2007); Scott R. Turner, *The Creative Process: A Computer Model of Storytelling* (Hilsdale, Hove: Lawrence Erlbaum Associates, 1994).
11. Jenkins, “Game Design as Narrative Architecture.”; Janet Murray, “From Game-Story to Cyberdrama,” in *First Person: New Media as Story, Performance, and Game*, ed. Noah Wardrip-Fruin and Pat Harrigan (Cambridge, Massachusetts; London, England: The MIT Press, 2004); Marie-Laure Ryan, *Narrative as Virtual Reality* (Baltimore, Mariland, USA: Johns Hopkins University Press, 2001); Noah Wardrip-Fruin and Pat Harrigan, eds., *First Person: New Media as Story, Performance, and Game* (Cambridge, Massachusetts, London, England: The MIT Press, 2004).
12. Paul Bailey, “Searching for Storiness: Story-Generation from a Reader’s Perspective” (paper presented at the AAAI Fall Symposium on Narrative Intelligence, Menlo Park, CA, USA, 1999); David Thue, Vadam Bulitko, and Marcia Spetch, “Making Stories Player-Specific: Delayed Authoring in Interactive Storytelling,” in *Interactive Storytelling*, ed. Ulrike Spierling and Nicolas Szilas (Berlin: Springer Berlin / Heidelberg, 2008).
13. Joshua Tanenbaum and Karen Tanenbaum, “The Reading Glove: Designing Interactions for Object-Based Tangible Storytelling,” in *International Conference on The Augmented Human* (Mageve, France: ACM Press, 2010).
14. Joshua Tanenbaum et al., “Authoring Tangible Interactive Narratives Using Cognitive Hyperlinks,” in *Intelligent Narrative Technologies III Workshop (INT3) at the Foundations of Digital Games Conference (FDG)* (Monterrey, CA, USA 2010).
15. Josh Tanenbaum, Karen Tanenbaum, and Alissa Antle. “The Reading Glove: Designing Interactions for Object-Based Tangible Storytelling.” In *Proceedings of the 1st Augmented Human International Conference* (Megeve, France, April 2-3), ACM Press, (2010) pp. 132-140.

the on screen advice or not. Each object has two clips of audio narration associated with it, so the reader must engage with each object multiple times to uncover all the story fragments.

The story embedded in the Reading Glove system was developed based on the objects, which were picked to fit a certain historical aesthetic. Other aspects of this aesthetic are echoed in the background image of the tabletop display and in the table itself. The plot of the story revolves around a British spy operating in French-occupied Algiers around the turn of the twentieth century. The narrative traces the spy's discovery that his cover has been blown and his unravelling of how this came about. The uncovering of facts in the narrative mimics the uncovering of story fragments that the readers perform with the objects. Thus, the puzzle-like nature of the story and the interaction support and reinforce each other. The fragmentary and non-linear nature of the interaction provides readers with opportunities to make their own meanings with the system, even as they attempt to solve the narrative puzzle within the installation. For more details on the creation of the narrative content for this system, see our previous work.<sup>16</sup>

## The Glove and Objects

The central component of the system is the Reading Glove itself, a soft fabric glove containing an Arduino Lilypad microcontroller, an Innovations ID-12 RFID reader, and an Xbee Series 2 wireless radio (see Figure 2).

Interactors pick up objects associated with the story, each of which has been tagged with an RFID chip. When the RFID reader in the palm of the glove detects a tag, the



Figure 2: The Reading Glove

tag ID is communicated wirelessly via the Xbee radio to a second Xbee unit connected to the serial port of a laptop. The serial data is read into a Java program in Eclipse, which processes the tag activation and triggers the audio playback of a specific “lexia:” a pre-recorded story fragment associated with the object.

## The Table and Recommender

In addition to generating audio feedback, picking up an object also triggers the reasoning engine to generate a set of recommendations that will be shown to the interactor when the audio clip nears its completion. The reasoning engine is a rule-based expert system written in the Jess language. The recommender system acts as a kind of “expert storyteller,” leading the reader through the narrative. Images displayed on the tabletop screen provide readers with clues about which object to interact with next. These recommendations encode knowledge about the chronology of the narrative, the thematic associations between lexia, and information about which lexia are crucial to gaining an understanding of the narrative.

## Theories of Meaning, Context, and Expectations

Successful meaning making with the Reading Glove system requires different literacies from those required to make meaning in linear fiction and in games. James Gee argues that playing games requires its own literacy: one which is bound up not only in the interplay of signs and symbols within games, but also within the culture of interaction and social practices surrounding them.<sup>17</sup> The meaning

16. Tanenbaum et al., “Authoring Tangible Interactive Narratives Using Cognitive Hyperlinks.”

17. James Paul Gee, *What Video Games Have to Teach Us About Learning and Literacy* (New York, NY, USA: Palgrave Macmillan, 2007).

of signs, then, emerges out of the social practice in which they are used (which places Gee squarely in line with Wittgenstein's notion that there is no private language<sup>18</sup> and also with Bakhtin's notion of heteroglossia, or polyphonicity).<sup>19</sup> Gee introduces the notion of "semiotic domains," which he defines as "any set of practices that recruits one or more modalities (e.g., oral or written language, images, equations, symbols, sounds, gestures, graphs, artifacts, etc.) to communicate distinctive types of meanings."<sup>20</sup> He argues that part of participating in a semiotic domain involves mastering "design grammars" related to that domain. Gee's notion of design grammars highlights the fact that practices within a semiotic domain are at some level designed by the members of its "affinity group." By emphasizing this notion, he argues that a semiotic domain's design grammar is not just the province of the "designers" within that domain, but of everyone engaged in it. Readers encountering a novel semiotic domain such as that in which the Reading Glove is embedded make meaning by identifying points of overlap between the known design grammars that they bring from familiar semiotic domains (such as reading fiction, or playing videogames) and the design grammars required for literacy within the new domain.

To put this in a different way, readers bring a particular set of expectations to a given text; the text then either reinforces those expectations or contradicts them. Elena Pasquinelli writes about the role of expectations in mediated experiences, particularly as they pertain to the believability of the experience:<sup>21</sup>

The notion of believability in mediated conditions can be characterized as a judgment regarding the plausibility of a certain mediated experience, the judgment being positive when the experience respects the expectations of the subject which are activated by the contents and context of the experience itself.<sup>22</sup>

Using virtual reality as the frame for this discussion, she proposes that mediated experiences must simultaneously deactivate unwanted expectations (which can be mapped to the "willing suspension of disbelief")<sup>23</sup> and activate desired expectations (which is in keeping with Murray's "active creation of belief").<sup>24</sup> We suggest that this schema of expectations goes beyond the phenomenon of believability and extends into the broader territory of meaning making within a mediated experience. The relationship between desired and unwanted expectations she describes can be understood through Gee's terminology as a communication of the design grammar of the experience, intended to teach the reader what is and isn't permissible within the semiotic domain of a new mediated experience. When the meanings situated within the semiotic domain of the author are recontextualized within the semiotic domains of the reader new meanings emerge for the reader. The result is a kind of "contextual feedback loop" between the two semiotic domains that persists until either the reader becomes fluent in the new domain, or the boundaries of the new domain expand to encompass some of the new meanings brought by the reader.

It is possible to view each act of reading as a negotiation from which meaning emerges. This negotiation of meaning is similar to how meaning emerges in a conversation, and it is highly contextual. Traditionally, context has been viewed as a form of information about the environment in which interactions take place that is stable, delineable, and separate from the activities that occur in that environment. Paul Dourish argues that this view of context as a stable phenomenon to be represented to computational systems is grounded in a set of positivistic assumptions about the nature of human interaction that have been demonstrated to be inadequate to describe and understand people interacting in the world.<sup>25</sup> He instead proposes a phenomenological account of human activity and context in which context is viewed as an emergent property of human interactions. His proposed perspective

18. Ludwig Wittgenstein, *Philosophical Investigations* (Malden, MA, USA: Blackwell Publishing, 1953).

19. Mikhail Bakhtin, "Discourse in the Novel," in *The Dialogic Imagination: Four Essays*, ed. Michael Holquist (Austin and London: University of Texas Press, 1981 [1936]).

20. James Paul Gee, *What Video Games Have to Teach Us About Learning and Literacy*. (New York, NY: Palgrave Macmillan, 2007) p.19.

21. Elena Pasquinelli, "The Role of Expectations in the Believability of Mediated Interactions" (paper presented at the International Conference on Enactive Interfaces, Montpellier, France, November 20-21, 2006 2006).

22. *Ibid.*, p. 201

23. Samuel Taylor Coleridge, *Biographia Literaria*, ed. J. M. Dent (London & New York: E.P. Dutton, 1952 c1906).

24. Janet Murray, *Hamlet on the Holodeck: The Future of Narrative in Cyberspace*.

25. Paul Dourish, *Where the Action Is: The Foundations of Embodied Interaction* (Cambridge: The MIT Press, 2001).

“[Sometimes] this narrative is pre-determined, and it’s just a question of which frame do I hear it from...other times it seems like this is a branching narrative, and, I can choose which branch I want.”

on context treats it as arising from an activity, rather than being a substrate in which the activity is situated. Dourish asks, “How and why, in the course of their interactions, do people achieve and maintain a mutual understanding of the context of their actions?”<sup>26</sup> He argues that this shift in framing of context is also a shift in the role of the designer in relationship to the creation of meaning in interactions.

By turning our attention from “context” (as a set of descriptive features of settings) to “practice” (forms of engagement with those settings), we assigned a central role to the meanings that people find in the world and the meanings of their actions there in terms of the consequences and interpretations of those actions for themselves and for others. The important point, however, is that we now see those meanings as essentially open-ended; we recognize that part of what people are doing when they adopt and adapt technologies, incorporating them into their own work, is creating and communicating new meanings through those technologies as their working practices evolve. The broad principle that these examples illustrate is that users, not designers, determine the meaning of the technologies that they use, through the ways in which they incorporate them into practice. Accordingly, the focus of the design is not simply “how can people get their work done,” but “how can people create their own meanings and uses for the system in use”; and in turn, this suggests an open approach in which users are active participants in the emergence of ways of working.<sup>27</sup>

Dourish’s notions of context and meaning as they relate to work with technology are particularly relevant to interactions with novel mediated systems, such as the Reading Glove. As designers of interactive narrative systems, it is important to understand how interactors will create meanings within an emergent context of use.

## Reader’s Responses to the Reading Glove

To gain an understanding of how readers make meaning with the Reading Glove, we are conducting extensive user studies with the system. These studies are ongoing, and we have not completed our analysis of the data, but preliminary observations have revealed some interesting responses to the system. As of this writing, we have observed twenty participants interacting with the system: twelve male and eight female.

## Study Protocol

Each participant is first screened for oral comprehension ability and language fluency using an audio story and short quiz taken from the intermediate level of the Northstar course on Listening and Speaking.<sup>28</sup> Participants fill out a short survey and are then given a short tutorial in using the Reading Glove, after which they are given as long as they like to interact with the system. They are told to interact until they feel like they understand the story. Following their interaction, participants are interviewed about the experience, from both “story understanding” and “technology experience” perspectives. Finally, participants are given a short exit survey to complete.

“Instead of trying not to die in *Choose Your Own Adventures*, in this you’re just trying to make sense of the whole story...I was taking it as a challenge to figure out what’s going on.”

26. *Ibid.*, p. 22

27. *Ibid.*, pp. 27-28.

28. Helen Sophia Solorzano and Jennifer P.L. Schmidt, *Northstar. Listening and Speaking : Intermediate*, 2nd Edition ed. (White Plains, NY: Longman, 2004).



Figure 3: Study Participants Interacting with The Reading Glove

## Observations

In the interviews participants frequently referred to other, more familiar semiotic domains to make sense of their experiences. When asked if using the system reminded them of any other interaction, many made reference to interactive guides in museums, to “Choose Your Own Adventure” stories, to branching hypertext narratives, and to the text and graphical adventure games of the late 1980s and early 1990s. One participant used metaphors from several domains including film and branching narratives: “[Sometimes] this narrative is pre-determined, and it’s just a question of which frame do I hear it from and other times it seems like this is a branching narrative and I can choose which branch I want.” Using these known domains as examples, participants were able to cogently describe the ways in which the Reading Glove resembled or diverged from their previous experiences. One participant said, “Instead of trying not to die in “Choose Your Own Adventures,” in this you’re just trying to make sense of the whole story...I was taking it as a challenge to figure out what was going on.” These semiotic domains were characterized by attempts to build bridges between generalized knowledge about a known medium, and the specific experiences they had with the Reading Glove.

Another pattern we observed in participants was their tendency to impose their expectations on the system in

very specific ways. Unlike the use of semiotic domains, participant expectations arose from very specific conceptualizations of how the system should operate, often rooted in recent mediated experiences, or preferred styles of interaction. One participant said: “I’m playing *Hotel Dusk* right now, and it reminded me a little bit of that. The idea that in computational media you have these characters you can interact with, and sometimes they’ll tell you the same thing over and over again, but sometimes after something else is triggered you can go back and find something new out.” Another participant expected that the system would work like an adventure game with objects that can be combined or used together to solve puzzles. In spite of the absence of any means of using objects together within the interface, this participant insisted on trying to find “actionable” uses for the objects, and was convinced that there was a game-like element to the system at which he was winning or losing. We also observed a form of expectations that manifested as “interest” or “intuition.” When asked why they chose to interact with a given object, many participants claimed that their decisions were guided by which object seemed the most “interesting” to them. The “interestingness” of a given object varied from participant to participant, indicating that some idiosyncratic set of prior assumptions and experiences was governing their choices.

Interactive context also played a role in how participants made sense of the story and the system. The non-



linear nature of the interaction provided participants with opportunities to develop their own conceptions of the sequencing of events within the story. Even when participants were able to reconstruct the basic events of the narrative, the order of several key scenes were commonly switched in ways that led to very different conclusions about what happened to the main character. When this occurred, it could often be attributed to the particular order in which participants interacted with the objects. In some cases, participants even attributed their order of interactions to specific occurrences within the story. One participant said:

I remember at one point I picked up the hat and he said that he picked up the hat to try and blend in with the bourgeois in Algiers and I think that might have been when he went to the bar. And so my suspicion is that instead of picking up the hat if I just picked up the beer bottle that he would have just gone into the bar instead of putting on the hat.

The other way that context contributed to participant meaning making was in the multimodal communication of narrative information. Although the date of the story was never mentioned in the text, almost all of the participants' guesses were within ten years of the correct date. In every case, participants attributed their guess to the apparent age and texture of the objects.

## Conclusions and Design Heuristics for Interactive Stories

In this paper, we have discussed three important theoretical perspectives on meaning making within mediated experiences, and demonstrated how they can be used to make sense of how readers encounter a novel interactive narrative system. It is possible to derive three design heuristics from these three perspectives, which we believe are important for designers of interactive narratives to consider.

### Heuristic 1: Support the development of literacy through an awareness of semiotic domains.

Readers of interactive narratives bring a lifetime of mediated experiences to bear on making sense of a new storytelling medium. By positioning a new work relative to existing semiotic domains, it is possible to encourage and support the development of the unique literacies needed to make meaning within an interactive story. Current interactive narrative systems within the research community often miss this point. *Façade*—arguably the most successful interactive narrative to come out of academic work—uses natural language based interaction in which readers type their communications to a pair of AI agents.<sup>29</sup> While natural language is a familiar modality of communication, it lacks the contextual specificity that characterizes a semiotic domain. As a result, interactions with *Façade* feel shapeless, disconnected, and often frustrating. Games do a much better job of leveraging semiotic domains to bootstrap literacy, drawing on multiple genre conventions and interactional vocabularies to support the player as she makes meaning through play. For designers of interactive narratives this means not reinventing the wheel with each new prototype. Perhaps more crucially, it means becoming familiar with the narrative pleasures to be had in existing semiotic domains, in order to best remediate them into new forms.



**Heuristic 2: Critically engage with the expectations of the imagined reader of the system.**

Readers' expectations can often cause them to disregard or misconstrue clues within an interactive narrative system. In some cases, this can lead to readers becoming frustrated when that the story does not work in the way they want it. to. Understanding how to deactivate unwanted expectations, and activate desired expectations can help mitigate this frustration. For designers, a crucial point here is to actively imagine the desired reader of your story as you create it. This is something that lies at the heart of most authoring practice; however it is not uncommon for designers of interactive narratives to construe the reader only as an unpredictable variable within the computational system.<sup>30</sup> In order to engage with the readers' expectations, authors of interactive stories must first imagine a reader that is seeking narrative pleasure, rather than simply searching for a way to break the game.

**Heuristic 3: Situate meaning within the interactional context of the narrative, not just the text.**

Interactive systems provide many opportunities to communicate information multi-modally using interface, sound, texture, visuals, and bodily interactions. All of these elements contribute to the emergent context in which readers make meaning. With the reading glove we attempted to foreground the role of the physical world in the experience

of the interactive narrative by using tangible objects to access story content. Other systems may be constrained to more typical desktop computing environments, however the context in which readers interact with them is still important. As designers, if we attend to the interactional context of our systems it becomes essential to highlight how our readers are interacting in addition to what they are doing. The things the reader does when she is not making explicit choices about the outcome of the narrative are just as salient to her experience as the things she does when she reaches a decision point. Within the research community, it is often the case that narratives are modeled as formal plot structures, where all of the attention is directed towards solving the branching points, with little regard to what the reader does in the rest of the experience.

What all of these heuristics have in common is a focus on devoting significant design attention and resources to the process of understanding how readers will interact with the story. Equally important is framing how we, as designers, think readers should interact with our stories. It is not sufficient to simply invest design resources into new technological systems for story creation without a coherent vision of how readers will get narrative pleasure out of the system. Our approach provides an important starting point for designers of interactive stories to begin coherently considering the readers of their systems that we believe is essential for the growth of interactive narrative as a medium.

## ACKNOWLEDGEMENTS

Funding for the Reading Glove is provided by the Canadian Graphics, Animation, and New Media (GRAND) NCE program, under the supervision of Jim Bizzocchi, Marek Hatala, and Ron Wakkary.

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