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Consuming the Database: The Reading Glove as a Case Study of Combinatorial Narrative

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The database is a fundamental knowledge structure in computing, and it has its own unique poetics. In this chapter we explore how databases and narratives have been theorized within electronic literature and new media and provide a few short readings of significant works that employ the poetics of the database. We then describe one of our own works—the Reading Glove—as a case study of combinatorial storytelling that reconciles the open-endedness of the database form with the experience of closure that allows a reader to feel as though a work has been completed or *consumed*.

Theories of Database Narrative

Lev Manovich has argued that the database is the natural enemy of narrative, writing that a database “represents the world as a list of items, and it refuses to order this list” (Manovich 2001: 225). From Manovich’s perspective the absence of a guiding logic or order puts the logics of the database directly in conflict with the logics of narrative, which he sees as a competing paradigm of meaning. Narrative, in this sense, is defined by the

ways in which it selectively excludes information from the database set, in order to force a certain ordering and elicit a specific meaning. To reconcile the logics of narrative and database, Manovich turns to the semiological notions of *syntagm* and *paradigm*, which may be loosely understood as the *explicit* elements from which a work is constructed (*syntagm*) and the *implicit* set of related elements from which the set might have been sourced (Manovich 2001). A parallel may be drawn between these concepts and the Russian formalist notions of *fabula* and *syuzhet*, as articulated by David Bordwell and Kristin in their canonical book *Film Art* (Bordwell and Thompson 1997). *Fabula* and *syuzhet* can loosely be translated as “story” and “plot” respectively. The *syuzhet* is the plot of a narrative as represented and encoded within a media artifact. It operates in relationship with filmic *style* to produce the *fabula* or *story* of a narrative, as interpreted and understood within the mind of the reader or viewer. Thus, when Manovich reconciles the logics of database with the logics of narrative, the database becomes the *paradigm* (*fabula* or plot) from which the *syntagm* (*syuzhet* or story) narrative is drawn. The relationship between database and narrative is one of selective perception, of parsing a trajectory through the *possibility space* of the database through a lens of causal ordering in order to assign meaning to the events encountered. This conception of narrativity is in line with the work of film scholar Edward Branigan, who regards narrative as a perceptual activity by which a viewer assembles and organizes unstructured data into a causally connected pattern (Branigan 1992). In the following section we explore how these poetics of database and narrative have been incorporated into combinatorial storytelling systems.

Significant Database Stories

The poetics of the database as a narrative form pre-date digital systems. Combinatorial and experimental literature has a rich tradition: consider, for example, the seminal work of the Oulipo group, as described in Wardrip-Fruin and Montfort (2003). Founded in the 1960s, Oulipo (short for the French “*Ouvroir de littérature potentielle*” or “workshop of potential literature”) as a literary movement explored intersections of algorithms, rules, mathematics, and language. Most relevant to our discussion of database narrative is Raymond Queneau’s “*Cent Mille Millions de Poèmes*” (often translated as “*A Hundred Thousand Billion Poems*”), a set of ten sonnets, each with fourteen lines, designed to be fully interchangeable between each other, bound so that each line is on a different strip of paper, allowing the reader to flip to any one of the 10^{14} possible permutations.

Contemporary electronic literature demonstrates the range of possible forms inherent in the database. Jillian McDonald’s *Snow Stories* (2005) uses

a database of film clips and sound to assemble footage in response to written narratives about snow.

Upon entering the site, the viewer is invited to share a written story about snow - fantasy, memory, or dream. Behind the scenes, the story is scanned for key words that match a database of parameters such as mood, landscape, danger, weather, population, and animals. Audio, video, and animation clips, stored in the database as well are similarly tagged. The visitor's story is translated into a non-linear movie based on the results of the text scan parameters, and the compiled film is displayed in a snowglobe.¹

Stuart Moulthrop's "Reagan Library" (Moulthrop 1999) can be seen as a database narrative, but one that actively prunes away its own possibility space as the reader traverses it. Moving across various "locales" rendered in QuicktimeVR (each accompanied by a hypertextual lexia), "Reagan Library" is notable in that its language becomes more coherent over time. Although not strictly linear, the content of the system is designed to eventually reveal its own *completeness*: over time the content begins to repeat itself, allowing a reader to experience a sense of closure.

Jim Andrews et al.'s *Stir Fry Texts* (Andrews, Lennon, and Masurel 1999) are a series of combinatorial text pieces for the web. The reader may flip through a set of interconnected texts, or she may mouse over any one of the texts, causing it to become "infected" or recombined with words from the other writings in the set. The result is a sense of the writings bleeding into each other, but in an unstable and unpredictable way.

Finally, Millie Niss and Martha Deed's *Oulipoems* (Niss and Deed 2004) take many of the techniques of the original Oulipo writers, and reconceive of them for the web. Their pieces include combinatorial poetry games like *Poggie* and *The Electronic Muse*, which provide an interactor with a set of textual, structural, and stylistic elements to assemble into poems. *Poggie* is more game-like, limiting the author/reader to a grid of textual elements that must be traversed/selected-from according to a set of rules within a span of time, while *The Electronic Muse* allows the interactor to select a poetic style from a list, and to choose parts of speech, and then generates lines of poetry according to these parameters.

A unifying theme connecting all of these approaches to combinatorial and database narrative is that the possible meaning space for the pieces is left wide open for the reader to configure. The authors create the *paradigm* and the *fabula*, and they devise an interface to that *paradigm* for the reader that is designed to expand on the possible *syntagm/syuzhet/story* rather than

¹<http://www.fringexhibitions.com/netarchives.html>.

foreclose upon a specific authored meaning or message. This open-ended experience of combinatorial narratives can be problematic.

Unstructured Databases, Structured Databases, and Ontologies

One of the central challenges facing authors of database narratives is achieving a sense of closure for the reader (Douglas 1994). Espen Aarseth's critique of hypertext narratives is appropriate here, in that he describes the sensation of being unable to fully apprehend a combinatorial text (Aarseth 1994).

When we look at the whole of such a nonlinear text, we cannot read it; and when we read it we cannot see the whole text. Something has come between us and the text, and that is ourselves, trying to read. This self consciousness forces us to take responsibility for what we read and to accept that it can never be the text itself. The text, far from yielding its riches to our critical gaze, appears to seduce us, but remains immaculate, recedes, and we are left with our partial and impure thoughts, like unworthy pilgrims beseeching an absent deity.

(Aarseth 1994: 769)

Aarseth makes a distinction between a “text” and a “script”: a script is comprised of the “visible words and spaces” while a text also includes a “practice, a structure, or ritual of use” (Aarseth 1994: 763). Thus, in the systems above we might say that the textual, graphical, and multimedia elements constitute the “scriptons” of the system, while the process of interaction along with whatever attendant practices each reader/user engages in through the experience would reveal the “textons” of the system. Some of these texts provide a collection of scriptons, with very few constraints or rules to shape the reader's interactions, while others provide both a *database* and an *interface* along with constraints on the interconnections between the objects within that database. At some point, these data structures cease to be simple databases and instead become *ontologies*: a formal knowledge representation of both the contents of the database and their interrelationships with each other. *Ontologies* have a rich history within electronic literature's parallel sister field: Interactive Digital Storytelling (or IDS). IDS has its origins in computer science and artificial intelligence, and shares many of the same intellectual commitments as electronic literature. However, where electronic literature has resulted in a diverse body of experimental texts, IDS has instead pursued increasingly sophisticated software instantiations

of formal narrative systems, and simulations of social worlds designed to produce *interactive dramas* similar to those envisioned in science fiction, such as Star Trek's *Holodeck* (Cavazza, Aylett, Dautenhahn, Fencott, and Charles 2000; Swartout et al. 2001). In the final section of this chapter we describe a system of our own creation that seeks to bridge the gap between these two approaches, by combining the theoretical and textual practices from electronic literature with the computational approaches to digital storytelling common in IDS.

The Reading Glove: A Case Study of Combinatorial Narrative

The Reading Glove is a wearable, tangible, interactive storytelling system that we developed in 2009 and 2010. It is comprised of the following elements:

- A wearable glove-based interface with a Radio Frequency Identification (RFID) reader in the palm of the glove and a wireless radio for communicating with a central server.
- A collection of antique (and antique seeming) objects, each tagged prominently with a unique RFID tag.
- A large horizontal tabletop display surface.
- A laptop running a software application that uses a rules-based expert system and an ontology of the narrative world to track reader interactions and make recommendations for where to go next in the story (via the tabletop display). The software layer also triggers playback of audio narration when an interactor picks up an object.

Interactors using the Reading Glove system “read” the story by picking up objects from the collection in order to trigger fragments of a narrative (lexia) that are associated with those objects. Over the course of multiple

FIGURE 1 *The Reading Glove system. From left to right: the tabletop display and objects, the Reading Glove and a tagged object, an interactor using the system, and the collection of narrative objects.*

interactions it becomes possible for readers to piece together the narrative like a puzzle. We construed the objects as “boundary objects,” a notion from ethnographic research in which an object is situated between two distinct and different cultures (Star and Griesemer 1989). Boundary objects allow for a point of contact and negotiation between cultures that lack other means of interaction: in the case of the Reading Glove, the objects existed within both the physical world of the reader and the imaginary world of the fiction. They were pieces of the fiction that the reader could hold, manipulate, and experience using senses that are not often deployed while engaging with other forms of fiction. Drawing on theories of affordance, we chose objects that constrained the body of the reader in particular ways, while affording very specific postures and bodily motions (Gibson 1977; Norman 1988). The coffee maker afforded turning the crank, the top hat and goggles afforded being worn in a particular way, the telegraph key afforded tapping and manipulation, etc. In this way, each object lent itself to a particularly embodied interaction.

The Reading Glove employs a number of techniques intended to aid the reader in achieving narrative closure; however, it never seeks to assert its authority over the reader as she explores its nonlinear narrative space. Some of these techniques are purely textual in nature: we coined the term *cognitive hyperlinks* (T. J. Tanenbaum, Tanenbaum, El-Nasr, and Hatala 2010) to describe a mode of authoring that layers the text with repetition, internal references, and other ordering cues to aid the reader in establishing a temporal chain of cause and effect between the lexia. Unlike the systems described above, there *is* a canonical ordering to the lexia within the Reading Glove, a linear narrative that is mediated through the nonlinear nature of its interface. The interface produces a nonlinear version of this narrative, but as with Moulthrop’s “Reagan Library”, the completeness of the story becomes apparent over time, with repetition signaling when the narrative has been fully “consumed.”

Other techniques used to support an experience of closure are highly computational, such as the expert system developed to recommend next

FIGURE 2 The “recommendation” screen for the Reading Glove in a neutral state (left) and a recommendation state (right).

steps (K. Tanenbaum, Hatala, Tanenbaum, Wakkary, and Antle 2013). This system employs both an ontology of the narrative logics underlying the lexia and an intelligent agent capable of recommending different traversals of the narrative space. We encoded three fundamental logics into this system: the logic of temporal ordering and causality; the logic of thematic connections between objects; and the logic of narrative importance (which lexia were most important for the reader to encounter to understand the narrative?). Each of these logics provided the basis for a recommendation, and each was assigned a specific color within the system so that readers would get different permutations of the story if they followed different recommended paths² (Figure 2).

The Reading Glove also remediates some of the poetics of live storytelling by including multiple variations of the narrated performance for each piece of text presented. Working with a professional actor, we captured several dozen variations of each lexia, ultimately paring them down to three versions of each piece of spoken narration. These variations are primarily distinguishable from each other by the pace of the reading—one is slow and deliberate, one is spoken at a normal rate, and one is rushed and urgent. The first time a reader encounters a lexia within the narrative it is the slowest version. Each subsequent encounter with that lexia is a little bit faster and more urgent. Thus, the tone of the story shifts over time from one of careful recounting to one of desperation, even as the text of the narrative remains unchanged.

Taken alongside the other techniques discussed above, this leads the reader towards a sense of closure. In these ways, the Reading Glove's design seeks to combine techniques from both electronic literature and interactive digital storytelling to produce a participatory narrative experience that draws on the poetics of combinatorial and database narrative, while still supporting a satisfying sense of having reached the conclusion of the story for the reader.

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²It is interesting to note that none of the readers of the system noticed the color coding in the recommendations, and none claimed to follow a particular path. We view this as a failure of design in the current instantiation of the story, and see it as an interesting opportunity for future iterations of this work.

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