

Procedural Montage: A Design Trace of Reflection and Refraction

Jasmine Otto (jtotto@ucsc.edu) and Angus G. Forbes (angus@ucsc.edu)

Abstract

Narrative media may vary the adjacency of fixed textual passages to drive rhizomatic readings through a montage procedure. We present the design of “exul mater”, a hypertext fiction which locates perlocutionary acts in virtual spaces and resonant gaps. We reflect on sculptural fiction, the (de)formance of complex systems, and tarot reading as methods of layering metaphorical blends into polysemous juxtapositional elements. “exul mater” consists of one set of such elements and their pairwise juxtapositions, as presented through an interface which supports higher-order ‘gap-filling’ reading(s). We draw on peer feedback to address challenges to readability arising from the narrative application of procedural montage.

Introduction

We describe “exul mater”, a short web-based story in a branching, card-based format. We consider the properties of this narrative system which induce *apophenia*, the eager perception of connections and meaning in unordered collections of like things (e.g. seeing strokes as forming letters, or letters as forming words). Its reader is invited to reminisce upon an immutable collection of events, which nonetheless may yield many different stories, as a querent would receive meaningfully different readings from the same tarot deck.

We locate “exul mater” amongst analog forms of procedural narrative, which include tarot reading, shuffle literature (Montfort and Husárová), and other games of order or causality (Short, “Card-Deck Narratives”). Although a linear causality of events exists in “exul mater”, it is not surfaced by our narrative’s text, which more closely resembles a sequence of frame stories. This work does not attempt to complete a telling regardless of the reader’s path, but instead presents each route as a deformation (McGann and Samuels) of the virtual space of narratives encoded by the deck. Our reader is thus

encouraged to perform narrative between the scenes, within the constraint of which cards exist in their hand, to locate events whose significance was hidden.

In this paper, we present the design of "exul mater", along with feedback from peer researchers of narrative design and visual culture. In the following text, quotes from this written correspondence are provided at the beginning of each section in gray intertext.

Construction

Our method of polysemous elements and productive gaps attempts to make a fixed topology of narrative content open-ended, by letting the reader select imprecisely among multiple selections of its scenes.

"exul mater" uses a concordance-like textual layout. Multiple scenes are laid out in alignment with each other, and are overlaid by the cards determining them (per 'Edge selections' below). Recent scene texts remain in alignment, faded out, until their card is completely replaced.

Cards are illustrated, representing characters (persons, institutions, or worlds) or themes (creatures, sites, or abstract concepts). As the text interrogates progress and hybridity through mythic tragedy, we ground out to images of sorceresses and their familiars.



Figure 1: Contrasting montages of cards with comparable themes and figures. Here, the 'priestess' and 'magician' cards are fixed in the center. The priestess may harbor dangerous thoughts, or a traitor. The magician may adopt reserve, or venom.

Edge selections

"I like how it feels like you're tinkering with this ancient device, trying to uncover a story in faded text. I had to reread each fragment many times but the interactivity makes that feel like a puzzle." -Reader 5

"The different permutations of the story build off of one another nicely, even with different arrangements of player input." -Reader 4

"One of my favorite parts is the small references between the three [routes] that give unity to the piece, but I also feel like just a few more connections between the three [routes] could have been made to help encourage you to keep rereading." -Reader 5

Each pair of cards induces one scene, which represents a missive, reflection, or something else epistolary. When one card in a two-card spread is replaced, the previous scene text is placed to the side and faded (but not completely hidden). If the new text was faded (rather than absent), it is revealed in place. Otherwise, its movement would disrupt reading.

We present the cards in a fixed branching sequence. After each choice of a card by the reader, we discard the alternative (if any) and reveal one or two new cards (which are predetermined). In order to view alternative routes, the reader can rewind to the top of the deck at any time.

Each route of four cards corresponds to six scenes: respectively, the vertices and edges of a tetrahedron. Each edge is adjacent to four edges (two by replacing each card), while the sixth and opposite edge could be reached in two moves, using only two-card spreads. (Routes of more than four cards would imply higher dimensional simplices, and their respective combinatorics.)

Although one-card spreads are trivial (no scene is revealed), three-card and four-card spreads are also possible. If three cards are present, then three pairs are present, and each of their scenes is revealed simultaneously. (This triple is one face of the tetrahedron, so each adjacent face shares one scene.) If any one card is removed, both pairs broken are faded.

If four cards are present, then all six pairs are revealed. Removing one card breaks three pairs. Because all four cards are opaque and take up screen space, it is unlikely that all

revealed scenes will be readable. The deformation necessarily performed by the reader is thereby made visible.

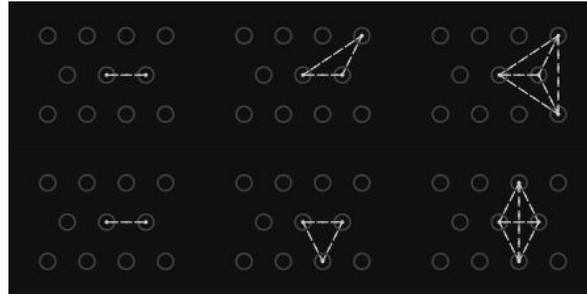


Figure 2: Diagram of storylet space, in six frames. Each node represents a card, and the center node is the first, fixed card. The two rows portray two routes, which diverge in the middle column: the second card chosen was the same, but the third card chosen was different.

Virtual spaces

Because they can return to their previous position by a simple series of actions, the reader is encouraged in a circular motion of review, similar to other shuffle literature (Montfort and Husárová) in its reflective framing.

Traditional tarot decks likewise encode a vast *virtual space* of readings into the combinatorics of various spreads of cards. Tarot spreads produce a superimposition of orderings designed to draw out intuitive answers to personal questions (Parrish) (Manning, "Tarot as Procedural Storytelling"). The range of possible and plausible readings from any tarot spread are malleable through the use of decks with varied suites, names, and imagery (Short, "Expressive Range in Tarot Decks").

Our system in "exul mater" is an example of sculptural fiction (Reed, "Changeful Tales") where the reader performs the work, whilst the author designs the space it may occupy. Such work creates apophenia - the recognition of patterns or subtext - inevitably, yet at unpredictable moments.

For instance, Fallen London (Failbetter Games) is a browser-based persistent-progression game with occult themes, which implies to the player a more extensive and involved world than could be directly implemented. Because it plays out daily over the course of actual years, the user has time to prod at the seams of that world, and it may grow to fill the available mental space.

We claim the polysemous juxtapositional elements in any given apophenic fiction are in fact interwoven and mutually reinforcing. "If you hammer a nail into a piece of wood,

the wood has a different resistance according to the place you attack it: we say that wood is not isotropic. Neither is the text: the edges, the seam, are unpredictable." (Barthes, 36). Tarot decks, especially, are in diffraction (Barad) with themselves - each of their elements with another possesses constructive or destructive resonances.

Contradictory orderings

We imagine the four voiced characters in *exul mater* as *flickering signifiers* (Raley, quoting Hayles). By allowing the presentation of each figure to vary widely between their scenes, which sit in an indeterminate order, they may "present [themselves] as a constantly refreshed image". Their polysemy is actually located in this variability, as much as their illustration(s) seek to surface it.

Our aesthetic goal is to enable many readings of literally the same scene, just as the montage effect describes a single face read with different expressions for what shots flanked it. We describe actual variation between, and imply virtual variation underneath, each presentation in each scene. This gestures at the performative fiction of identity, as undertaken by people attempting to be recognized as characters.

The reader may rearrange scenes (edges) in *exul mater* at will, within their current spread, which is topologically a *simplex* (i.e. a triangle of three cards, or a tetrahedron of four cards, and so on). Mere juxtaposition can produce virtual narrative (King) that is imagined yet unwritten, that is present without happening. By different elements of the scenes being diffracted with their neighbors, so every reading of the text is performed by reader intervention.

For instance, any spread of three cards will produce a triple of texts. "Neighboring stories" of this form share two cards. But not all triples are neighbors, resulting in textural gaps. In addition, the branching selection of cards reveals rival interpretations, by various shifts of perspective.

Inferred causality

"I can't, however, decide whether it is a stream of consciousness fragmented and pieced together to tell a story or fragmented mourning and sorrow that refuse to arrive at a destination." -Reader 7

"I wonder if, through divination, the daughter's exile can be ended, or if it is only a lens through which to understand." -Reader 2

"Much like tarot, it's best to glean an initial impression of the figure and what it might mean upon seeing it appear." -Reader 1

Each scene in "exul mater" is triggered by and comments on the relationship between two cards, typically in the form of a character addressing another character about their involvement in it. Relationships can be as simple as murder - because such acts foreclose on future possibilities, thus dictating causality - or as complex as vengeance. The relationship, as a perlocutionary act, emerges from those acts it implies and is implied by (Blommaert, 22). But in a puzzle whose solution is "love", the only word prohibited is "love" (Borges, 34).

If the same character may act in many different capacities, then even small casts imply very many different scenes. But the ideal place to position a scene is at a *saddle point* (a narrative watershed, from which outcomes diverge), where relationships are about to be reconfigured. Human readers are excellent at interpolating in between, imagining how a character reached point B from A - we may imagine fraught months of deception, from only the evening the spies nearly were caught.

Plot may be seen as a scheme to exhaust every interesting configuration of a relationship. This is clearest when a climactic scene teeters over the saddle point toward tragedy (e.g. the protagonist at the altar entering a loveless marriage), only to swerve back again. We propose that a virtual form of this other world exists if and only if the reader was made to pause and think of it.

Consider the narrative motion experienced by the remaining scene (out of three) when one card out of three is changed. This effect can be causally productive, enacting a cut (Barad), by changing e.g. the reason for an action taken, or the outcome of those choices. Following this action, the revealed text now has a virtual counterpart, a might-have-been.

We call the movement between adjacent spreads a *triangle closure*, alluding to the more general form of narrative closure, as found between successive panels in a comic book (McCloud). These near-misses, layered upon each other, together comprise a set of alternative causalities, which we regard as a re-reading.

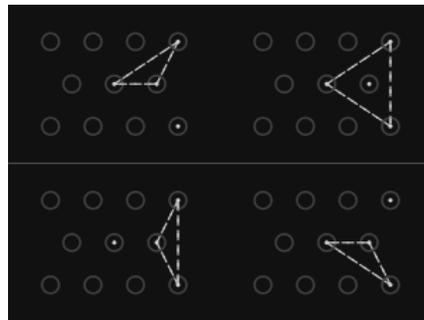


Figure 3: A space of three-card spreads, with (horizontal and vertical) adjacency given by replacing any one card. Adjacent spreads share exactly one edge, corresponding to a fixed scene, which experiences that movement as a triangle closure. Taken altogether, these scenes comprise a four-card spread (see previous figure, top-right).

Productive gaps

Calvino's combinatorial approach in *The Castle of Crossed Destinies* (Cannon) generates a multiplicity of plots from spreads of the popular Rider-Waite tarot (a deck of playing cards including the set of character archetypes known as the *major arcana*). Any given card possesses no single reading - rather, its meaning lies outside of itself, in its order with its neighbors. Yet the mere presence of unused cards in a narrative might entice the reader to find further nuance inside of the idea that a given iteration has presented.

These 'productive gaps' are *lacunae* (Manning, *on lacunae*), narrative elements which exist at the margins of the work, whether in friction with its meaning, or by visibly failing to exist. Lacunae are virtual, located in between texts, as apophenia and intuited connections. They are typical of narrative metacognition, as Calvino demonstrated by compelling his characters to read each others' stories, with no ability to negotiate a 'correct' reading amongst themselves.

Triangle closures, as a movement between readings of flickering signifiers, are themselves a meaningful gap which the reader may be driven to account for. Our aesthetic goal is (additionally) to enable many readings of literally the same spread, as the reader settles on one possible causal interpretation, especially if we cannot predict or even account for that interpretation (Kumari et al.).

Recombinatorial engines

Shuffle literature plays with polysemy and metaphorical blending, similarly to the mathematical intuition underlying a proof, in which exists an intricate contingency of the metaphorical blends (Lakoff and Núñez) forming each entity: "[...] the proof always springs from the insight, and not the other way round - and that the insight itself has its source [...] in a delicate and obstinate feeling of the relevant entities and concepts and their mutual relations." (Grothendieck)

Current works of digital narrative also deploy lacunae and resonance to locate the pleasures of rearranging a text, as demonstrated by the following two examples.

Telling Lies (Barlow) presents its topology through a heavily diegetic search interface, which relies on the gaps created by revealing only the five videos earliest in its timeline whose transcript contains a keyword match for any given query. In an operationalized variety of deformance (McGann and Samuels), the reader is forced to arrange the most meaningful series of records that could exist for them at each moment, bootstrapping their knowledge of the characters and their relations from nothing.

The Ice-Bound Concordance (Reed et al.) casts the player as the assistant to a posthumous author, who has written a novel but cannot arrange it. The virtual space of all the novels that could be written is explicitly the object of inquiry. Mechanically, the subset of sockets (cards) selected enables certain events (scenes) in each chapter, by certain boolean combinations.

Ice-Bound presents a small subset of the possible tokens for each chapter, so that the reader has no hope of realizing all of its plots without revisit. To lock in any given theme (which unblocks future sockets) at the end of chapter, the player must search the companion book for imagery, sealed documents, and ephemera from the digital author's life, filling the lacuna ("where did this idea germinate?") with a resonant image or story.

Obstacles

Playtester feedback has revealed various issues of obscurity in "exul mater" over its development. As meaning-in-gaps is most effective when it resonates at a personal level (by elision of detail), it is prone to being enigmatic too, like a cipher without its key. We consider possible remedies to the confusion engendered by our context-dependent text content.

Obscured characters

"It may be beneficial to provide some background story to the characters so I have an idea of what has led to the point of contemplation and questioning."

-Reader 1

"[...] for me the strength of this piece comes from being able to detect the emotions and relationships even if the details are obscured, and so I feel like not being able to figure who a character is at odds with this." -Reader 5

"I think as a way [of] providing more (albeit loose) framework, the player can choose which dyad of characters to investigate with the different tarot lenses, and a dramatis personae of the characters and/or cards as they relate to that dyad." -Reader 3

"exul mater" represents its cards as selected major arcana, and identifies each with a character. Cards are the common threads between multiple scenes, and together produce an emotional, thematic palette for the world in the story. A card is an original illustration (with character-specific imagery) paired to a short epithet, which may either name a character unambiguously, or else a suitable major arcana. (The name of the archetype is contingent on the card's position in the text, as the same illustration can have many names.)

We label the observer of each scene in the style of a script. A fixed point of view is infeasible when no single character is aware of all the scenes we need to establish each saddle point in the complex system which we portray them as navigating. Even characters observing the same scene will necessarily have different interpretations, which are desirable to contrast.

As character relations need only be revealed one or two at a time, each scene is only three paragraphs. Even shorter passages (ideally down to 100-word drabbles) would exert greater juxtapositional force, but are more difficult to ground out to characters. Whereas lyricism and emotional resonance require quick identification of specific characters in various guises.

And we don't even know if the reader knows a certain name for a character, or a certain relation of theirs. Any ambiguity in which name means which character is potentially counterproductive. Yet it arises naturally through both the multiplicity of individual

characters (leading to a proliferation of names), and direct parallels between the relationships of various characters (i.e. repeating patterns, rhyming plots).

Unfamiliar interface

"I felt like the fact that some of the passages were retained while new ones appeared was supposed to invite me to compare and contrast the passages but I don't think that came across in my behavior. Instead, I ignored passages I had already read and interacted with the machines looking for new prose." -Reader 6

"Seeing prose appear as I arrange the tarot cards makes me curious what the relationship is between the cards and the text, and I wonder if the names mentioned are gods of some pantheon foreign to me. [...] As I read further I understand that these names aren't those of gods, but of mortals." -Reader 2

Although using tarot as a metaphor prompted a number of our peer respondents to accept the fragmented qualities of "exul mater", this was not always sufficient guidance.

Further iteration on the work led to a drag-and-drop interface (choose m out of n cards), which is the most common representation of subset selection in shuffle literature. We also tried interfaces using fixed slots (put n lights in m sockets, as in *Ice-Bound*), or a set of switches (m out of n can be active together, as in multiple-selection lists), or a rotating simplex (let the camera face m out of n vertices, with purely theoretical precedent). None were as legible.

The possibilities of interpreted spatial proximity, beyond excluding cards occluded by others, remain latent. The possibilities of on-hover text for clarification (e.g. against an explicit database, as in Inkle's *Heaven's Vault*) are more evident, but less feasible for our implicit knowledge representation.

Other forms of description folding on keywords or short phrases include hover text (e.g. Obsidian's *Tyranny*) and shimmer text (e.g. various Twine games). Hover text fragments can cause their hidden referent (a footnote, or a linked article) to appear beside the text. Shimmer text fragments can be cycled through a few authored variations, and may include character creation choices, collapsible summaries, or reframings of perspective (e.g. Reed et al.'s *Ice-Bound*). Each mode of juxtaposition is expressive and produces its own resonances.

Difficult texts

"Recasting this project as a manuscript would let you keep the obscurity and let us project onto the piece. As a game there wasn't enough connection between the playable elements and the story for me to understand it." -Reader 8

"But I was never able to figure out if each configuration of the piece was a window into a larger story, or if each configuration was supposed to be a different story from the other configurations." -Reader 9

The scene texts in "exul mater" carry the weight of both carrying a literal scene and producing figurative resonances. These fragments easily become alienating unless the card images are very literal. Rather than describe an intersection of scenes, these are more like entities that carry between scenes.

Our scenes are not written from single words; each relationship between characters has emotional overtones, so we used song lyrics interleaved as couplets to prompt each scene. The scene text must evoke or enact or discuss an interaction the given pair could have in one of their mutually defining capacities.

In "exul mater", using figures who ascribe different forms of villainy to each other, whose actions are forced by systems which they each articulate differently, we seek to describe systemic violence. Between scenes are the saddle points upon which those tragedies are willingly replicated. The beliefs and traits of each participating entity must cohere; they should prove the unexpected coexistence of certain roles, and so articulate what cannot be systematized (Raley).

Conclusions

We anticipate seeing more and more shuffle literature incorporated into narrative games, especially those seeking to be highly replayable, yet being limited by the cost of content, or by the burden of avoiding self-contradiction (due to statefulness). In future works, we plan to investigate further structuring interface elements, beyond the prompts. Perhaps scenes can be indicated as events upon a timeline, or character aliases can be called out with a contextualizing highlight.

"exul mater" is available online. It was prototyped using the ObservableHQ, which supports interactive recombination of elements. While authoring, this allows us to see

the selected text alongside the juxtaposed images, and to edit text with zero recompilation delay. However, the prototyping notebook is a general-purpose tool. While our code is open-source (using a flat representation of scene text, inspired by Inkle's ink language), it is not a well-documented authoring tool. Because the structure of branching simplices is distinct from the locative fiction supported by existing sculptural hypertext authoring (Kitromili et al.), we may extend our notebook to facilitate authoring new decks.

We look forward to seeing the craft of flickering signifiers continue to be developed in procedural formats, inspired by both the capacities of modern hypertext, and traditional forms of magic and myth-making.

Bibliography

- Barad, Karen. "Posthumanist Performativity: Toward an Understanding of How Matter Comes to Matter." *Signs: Journal of Women in Culture and Society*, vol. 28, no. 3, Mar. 2003, pp. 801–31. *journals.uchicago.edu* (Atypon), doi:[10.1086/345321](https://doi.org/10.1086/345321).
- Barlow, Sam. *Telling Lies*. 23 Aug. 2019, <http://www.tellingliesgame.com/>.
- Blommaert, Jan. "Meaning as a Nonlinear Effect: The Birth of Cool." *AILA Review*, vol. 28, no. 1, John Benjamins, Jan. 2015, pp. 7–27. *www.jbe-platform.com*, doi:[10.1075/aila.28.01blo](https://doi.org/10.1075/aila.28.01blo).
- Borges, Jorge L. *The Garden of Forking Paths*. Rpt. in *The New Media Reader*. By Nick Montfort and Noah Wardrip-Fruin. The MIT Press, Feb. 2003. Trans. Donald A. Yates. *Labyrinths: Selected Stories & Other Writings*, pp. 19–29. Ed. Donald A. Yates and James E. Irby. New York: New Directions, 1964. From the Spanish "El jardín de senderos que se bifurcan." Buenos Aires: Sur, 1941.
- Cannon, Joann. "Literature as Combinatory Game: Italo Calvino's *The Castle of Crossed Destinies*." *Critique: Studies in Contemporary Fiction*, vol. 21, no. 1, July 1979, pp. 83–92. *Crossref*, doi:[10.1080/00111619.1979.9935198](https://doi.org/10.1080/00111619.1979.9935198).

- Failbetter Games. *Fallen London*. <https://www.failbettergames.com/fallen-london/>. Accessed 3 Dec. 2019.
- Grothendieck, Alexander. "Letter to G. Faltings (Translation into English)." *Geometric Galois Actions*, July 1997, doi:[10.1017/CBO9780511758874.018](https://doi.org/10.1017/CBO9780511758874.018).
- King, Homy. *Virtual Memory: Time-Based Art and the Dream of Digitality*. Duke University Press, 2015.
- Kitromili, Sofia, et al. "How Do Writing Tools Shape Interactive Stories?" *Interactive Storytelling*, edited by Rebecca Rouse et al., Springer International Publishing, 2018, pp. 514–22.
- Kumari, Shringi, et al. "Why Game Designers Should Study Magic." *Proceedings of the 13th International Conference on the Foundations of Digital Games*, ACM, 2018, pp. 30:1–30:8. *ACM Digital Library*, doi:[10.1145/3235765.3235788](https://doi.org/10.1145/3235765.3235788).
- Lakoff, George, and Rafael E. Núñez. *Where Mathematics Comes from: How the Embodied Mind Brings Mathematics Into Being*. Basic Books, 2000.
- Manning, Cat. "On Lacunae by Catacalypto." *Itch.io*, Feb. 2018, <https://catacalypto.itch.io/on-lacunae>.
- Manning, Cat. "Chapter 26, Tarot as Procedural Storytelling." *Procedural Storytelling in Game Design*, edited by Tarn Adams, CRC Press, 2019.
- McCloud, Scott. *Understanding Comics*. Harper Collins, 1994.
- McGann, Jerome, and Lisa Samuels. "Deformance and Interpretation." *Radiant Textuality: Literary Studies after the World Wide Web*, Springer, 2016.
- Montfort, Nick, and Zuzana Husárová. *Shuffle Literature and the Hand of Fate | Electronic Book Review*.

<http://electronicbookreview.com/essay/shuffle-literature-and-the-hand-of-fate/>.

Accessed 1 Dec. 2019.

Palumbo, Donald. *Tarot Reading as Recombinant Narrative: Literature as Game/Game as Literature*. 1979. ERIC, <https://eric.ed.gov/?id=ED199742>.

Parrish, Allison. *Tarot as Collaborative Storytelling · Word Game Workshop*.

<http://word-game-workshop.decontextualize.com/tarot/>. Accessed 13 Apr. 2019.

Raley, Rita. "Reveal Codes: Hypertext and Performance." *Postmodern Culture*, vol. 12, no. 1, Oct. 2001. *Project MUSE*, doi:[10.1353/pmc.2001.0023](https://doi.org/10.1353/pmc.2001.0023).

Reed, Aaron. *Changeful Tales: Design-Driven Approaches Toward More Expressive Storygames*. UC Santa Cruz, 2017. *escholarship.org*, <https://escholarship.org/uc/item/8838j82v>.

Reed, Aaron A., et al. *Ice-Bound: Combining Richly-Realized Story with Expressive Gameplay*. 2014, p. 8.

Short, Emily. "Card-Deck Narratives." *Emily Short's Interactive Storytelling*, 3 May 2016, <https://emshort.blog/2016/05/03/card-deck-narratives/>.

---. "Expressive Range in Tarot Decks." *Emily Short's Interactive Storytelling*, 3 May 2018, <https://emshort.blog/2018/05/03/favorite-tarot-decks/>.

The Observable Dataflow Runtime. Contribute to Observablehq/Runtime Development by Creating an Account on GitHub. 2017. Observable, 2019. *GitHub*, <https://github.com/observablehq/runtime>.