

The Eureka Design Pattern in Expressive Storygames

Aaron Reed, Noah Wardrip-Fruin, and Michael Mateas

University of California Santa Cruz
1156 High Street
Santa Cruz, California 95064

Abstract

We discuss a design pattern found in expressive storygames, the eureka, which describes a specific dynamic arising from some adventure game puzzles where the player experiences a moment of revelation connecting the narrative and ludic planes. Eureka patterns have largely been designed out of modern storygames in favor of patterns that reduce the possibility of failure (as seen in the fall of the “puzzle” and rise of the “quest”), but this shift often eliminates the unique pleasures often found in a successful eureka. We demonstrate both how the eureka is a useful concept in analyzing existing adventure games and how it can inform designers hoping to create more successful eureka patterns.

Terms: “Expressive” and “Storygame”

Let us imagine two computer programs, one of which offers its user a series of choices between three options, and another of which lets the user arrange colored blocks on patterns in a grid. While both programs have a finite range of input, the player’s perception of the second program is that it offers more freedom of expression. The second program’s input could be reduced to choosing options from a very long list (“Red Block A1,” “Red Block A2,” and so on) but it seems clear the range of possible inputs is too large for this to be an elegant control scheme. If rather the player must operate the system through issuing compound instructions—such as first clicking the red block icon, then clicking a pixel on the screen—the player is able to make “discoveries” about what kind of inputs are possible (such as filling the whole screen with blue blocks, an option perhaps not initially considered as the program was first encountered). We can call this kind of program “expressive,” although note that by this we refer only to the program’s input style, not what the software chooses to do with that input.

Consider now a style of digital game that has expressive input connected to a “storygame” (Buckles 1985). By storygame, we mean a system with both narrative (story) and ludic (gameplay) elements that are not only both essential to the overall experience, but are also interconnected. For instance, while the game *SpaceChem* features alternating

sequences of story and gameplay, they occur in isolation and have no effect on each other. In contrast, in the storygame *The Secret of Monkey Island* can only be traversed through continually operating the ludic mechanisms of the game software: the story cannot be uncovered without the gameplay, and the gameplay (taking actions such as drinking grog, or strategically insulting a pirate) only makes sense in context of the story. In addition, the connection should be strong enough that aspects of one system can be intuited by knowledge of the other. In an abstract puzzle game like chess, for instance, the player must understand the rules to know that moving a knight into a queen’s capture range is a dangerous action. In a storygame, however, the player’s knowledge of the narrative world can inform their ludic actions without direct instruction: players might correctly assume, without being told, that shooting a police officer is a dangerous action for their character to take.

The Eureka Design Pattern

In the remainder of this paper, we’ll discuss a design pattern found specifically in expressive storygames as defined above. Many of these games are characterized by “puzzles,” moments where it’s unclear which of many possible actions will advance the narrative. We propose that the designer of an expressive storygame puzzle intends the player to experience a specific sequence of steps, all of which are crucial to the overall effect:

1. The player is unsure what ludic action will advance the narrative
2. They have a moment of revelation, realizing a previously unconsidered ludic action can achieve a desired narrative result
3. They prepare and carry out a plan to execute this action, feeling anticipation that it will be successful
4. The plan is successful; they feel validated and relieved

We refer to this entire design pattern as a “eureka” for purposes of discussion. A player who has the designer’s intended experience can be said to have experienced a “successful eureka,” while if any of these steps fails for a particular player, that player experienced a “failed eureka.”¹

¹Note that the eureka design pattern focuses on the experience of an individual player, not the designer or players in general, and

First, how does a eureka differ from puzzle-solving in other contexts, such as abstract puzzle games or creative problem solving? One distinction is that they rely on and require the tension between two levels of representation, narrative and ludic (see Figure 1). The puzzles in *SpaceChem* can be solved purely by applying the logical rules introduced inside the game: there is no tension around whether an idea will mechanically work, just whether it can be successfully executed. In an expressive storygame, however, the player's plan—the idea, not the execution—may or may not prove valid, depending on whether the designer's and player's mappings between the two planes, narrative and ludic, are in alignment.

One of the interesting things about the eureka design pattern is that while it is both foundational to the style of game it thrives within, it tends to be remembered more for its failures than for its successes. A eureka may fail in any number of ways, leading to confusion, frustration, or other negative emotions from the player.

- The player might come up with a solution that seems perfectly valid on the narrative plane but was not ludically encoded by the designer (step 4 fails).
- The player might have the right idea but be unsure how to communicate it to the game, a situation called the “guess the verb” problem in interactive fiction (Nelson 1995); in this case step 3 becomes an insurmountable obstacle.
- The player might be unable to think of an idea, and eventually give up and look for the solution in a hint guide; by skipping most of the pattern's steps, however, they're deprived of its unique pleasures.
- The player might accidentally stumble across the solution at random or without understanding it, again depriving themselves of the pattern's unique pleasures that hinge upon a moment of discovery and tension while the plan is carried out and executed.

By identifying the specific features found in a successful eureka, and particular ways in which this design pattern might fail, we hope to offer designers a more precise lens with which to both analyze existing storygames and to design future games with an eye towards increasing the number of successful eureka experiences by players (see “Why is the eureka worth saving?” below).

Related Work

Several styles of game in which eureka experiences are commonly encountered have been studied together and separately by scholars and practitioners. For instance, Nick Montfort (2003) and Jeremy Douglass (2007) have both written book-length studies of the genre called “interactive fiction” or “text adventures.” Montfort identifies a work of IF as having four elements, being “(1) a text-accepting, text-generating computer program; (2) a potential narrative, that is, a system that produces narrative during interaction; (3) a simulation of an

environment or world; and (4) a structure of rules within which an outcome is sought, also known as a game” (pg. 23; numbering mine). Montfort also expands this last point to include the trope that most IF includes *puzzles*, logical challenges which gate narrative advancement, and theorizes that IF puzzles are best understood as participating in the literary tradition of the riddle. Douglass defines IF somewhat differently, calling it “a technology of command line, text parser, and object model” and a “command line genre,” and says IF is best understood in terms of “exploration and interrogation.” For Douglass the command line interface is key to IF: it creates an opportunity for players to interrogate the work and receive responses that allow further understanding.

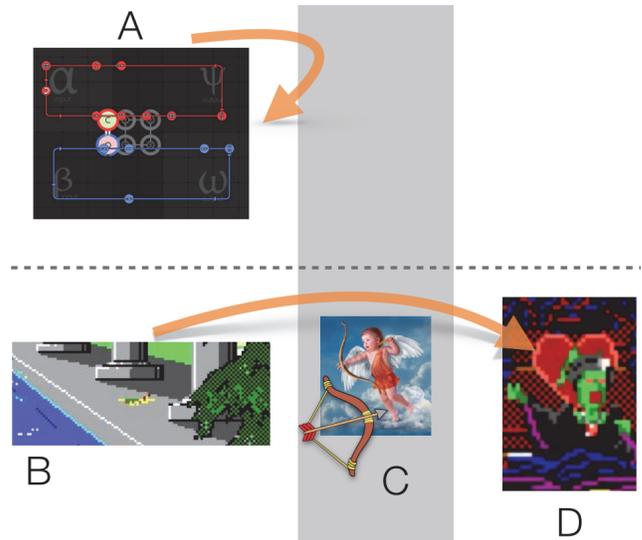


Figure 1: The eureka pattern is specific to expressive storygames. While *SpaceChem*'s puzzles (A) require no information outside the ludic plane to solve, the unique pleasure of a successful eureka comes from the uncertainty (C) of whether a metaphorical mapping from ludic to narrative will succeed. In *King's Quest IV*, the player must map the game object of Cupid's bow (B) onto a narrative understanding of the character of Cupid and the mechanics of bows to suggest a ludic affordance: shooting an enemy with Cupid's bow to make her love you (D).

Both Montfort and Douglass aim to study “the genre historically called ‘interactive fiction’” (Douglass), thus restricting their scope to text-based works; Montfort states “the purely graphical adventure is another story altogether.” However, IF author Andrew Plotkin has challenged this circumscription (2011). In interrogating various definitions of IF, he concludes that graphical adventures can produce the same types of experiences: “both provoke the same response: ‘What should I do?’ mingled inextricably with ‘What *can* I do?’” In both kinds of game, the key is “the player's need to understand the game world.” Fernández-Vara comes to similar conclusions in her study of the “adventure game” (2009) which in her typology encompasses IF, graphic adventures, and “point-and-click games” like *Myst*. She defines the adventure game as “story-driven videogames, which encourage exploration and puzzle solv-

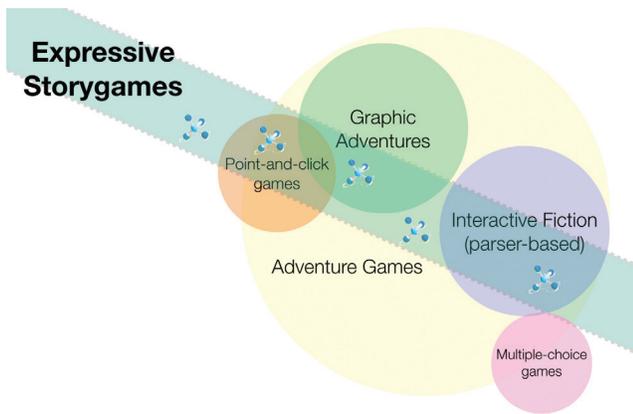


Figure 2: A view of how expressive storygames slice across several established genres of storygame, following the vein of eurekaons. Expressive storygames include some games that fall outside of these genres, while exclude some games normally seen as falling within them.

ing,” and also identifier object manipulation, spatial navigation, and puzzles integrated into the fictional world as foundational features of the genre.

All four authors identify different aspects of an overlapping design space (Figure 2) as of key importance. While none make it part of their core definition, all agree the type of work they write about hinges around revelatory moments. Montfort says riddles must “awaken to a new vision of the world”; Douglass discusses the “implied code” of the reader’s model of the world and its refinement through interrogation; Fernández-Vara describes a “moment of illumination” when the player understands the action necessary to restore a pre-set behavior; and finally Plotkin describes how understanding the world “must be the primary means of determining what is possible” within it. This understanding, illumination, awakening seems to us the key quality that many of these games are centered around, and our term “expressive storygame” is an attempt to include games (no matter what genre) which highlight this experience (a play style centered around encountering eurekaons) while excluding those to which it is less significant.

Similarly, some existing scholarship has focused on cataloging design patterns found in certain genres of game, including first-person shooters (Hullett and Whitehead 2010), platformers (Boutros 2006), and computer role-playing games (Smith et al. 2011). This work descends from suggestions that the existing software engineering practice of gathering craft knowledge into formal patterns could be useful for game designers (Kreimeier 2002). Eurekaons are a design pattern that cuts across commonly established genres to identify features that seemingly disparate story-based games have in common.

Most existing work studying patterns similar to eurekaons is in the extensive craft-based literature around puzzle design for IF and adventure games (Ingold 2011; Bates 1997; Short 2009). Designer Chris Hocking has talked about balancing the “composition phrase” of formulating plans and

the “execution phase” of carrying out actions in the context of enabling player improvisation within a more action-focused game world (2009). Treanor (2013) describes two registers of interpretation for games, an instantial and a simulative, the latter of which necessitates a metaphorical mapping of the player’s understanding of real-world objects onto digital assets; this is a more generalized version of the eurekaon’s reliance on the tension between narrative and ludic planes.

Applying eurekaons

Once we have established the eurekaon design pattern, we can follow it like a vein of ore through whatever existing game genres happen to include it. Scholarship into the descriptive genres mentioned above is often complexified by fundamentally different play dynamics within games of the same genre. The eurekaon pattern describes a specific player experience that we can study regardless of what descriptive genre the game it comes from is classified in.

As an example, the game *Limbo* (generally classified as a puzzle platformer) features a puzzle in which the body of a defeated giant spider, now legless, can be rolled into a pit to allow forward progress. We might compare this to a puzzle in *Portal 2* (often classified as an “action-adventure” or “puzzle” game) where the player must recognize that a defective turret can be intercepted before its incineration and swapped for a template turret in an assembly line control room, making all further manufactured turrets defective. While both moments can be identified as eurekaons (hinging upon the player having a moment of realization where they realize a neutered enemy can unexpectedly provide a path forward), their design is not often discussed together in storygame craft or theory communities. Similarly, *Limbo*, the graphic adventure *Space Quest II*, and the interactive fiction *Trinity*, despite being in theoretically different descriptive genres, all feature a puzzle where the player realizes a dead tree can be pushed over to create a path to a previously inaccessible area: the player’s mapping of real-world knowledge onto the narrative plane (dead trees are unstable) intersects hopefully and ultimately successfully with the ludic affordances (movement against the tree, typing PUSH TREE at the command prompt, or both).

The specificity of the eurekaon design pattern also lets us clarify discussions by pointing out that many storygames classified together have less in common than their descriptive genre suggests. *Gone Home* and *Dear Esther*, two recent successful indie games that are often classified as “adventure games,”² both arguably lack eurekaon-like moments. Both games do not require any understanding of the narrative plane to ludically advance, and since expressivity is limited, there is rarely confusion (or opportunities for decision-making) about what action to take next. While *Gone Home* features puzzles in the form of several “lock and key” obstacles, these do not interact with the game’s narrative in a meaningful way. We are fans of both these games and our in-

²Both games are categorized as adventure games on the distribution platform Steam, for instance, and were reviewed by the fan site adventuregamers.com.

tent is not to disparage them, but merely to point out that they are based around very different play dynamics than games using the eureka design pattern, and it is perhaps more useful to compare *Machinarium* to *Portal 2*, for instance, than to *Dear Esther*.

Why is the eureka worth saving?

Because of their propensity to failure, eureka games have largely been designed out of modern storygames. While early '90s graphic adventures often had a palette of possible actions, most 21st-century adventure games (such as *Machinarium* or *Broken Age*) limit the player's expressiveness, often to a single verb ("click"). Text-based games are moving away from expressive parsers to prescriptive choice-based alternatives: over half the entries in the 2013 IF Competition, once dominated by parsers, were games with an input mechanic based on choosing options from a list.³ The dominant structure for interactive story in the mainstream games industry has moved from the "puzzle" to the "quest" (Tosca 2003), the latter no longer a chance for creativity but a mere job to perform: each step clearly described, marked on a map, and signposted with glowing waypoints. The role of player creativity, insight, and free expression within a story world has often been neglected in modern design. We hope identifying specific design patterns and studying how they succeed and fail will be a step towards reintroducing the successful aspects of this design pattern into future storygames.

For instance, the particulars of the eureka suggests that simulationism in adventure games is worth pursuing in future design. The successful indie game *Prom Week*, which we designed and released in 2012, features a detailed social simulation of the desires and actions of a cast of interconnected characters. While not a traditional storygame (there is no single story arc the player is progressing through, for example) much of *Prom Week*'s critical success is attributed to player excitement at having a wide range of potential ludic actions to solve narrative problems (Pearson 2012) and the ability to come up with creative solutions to story obstacles (Stephens 2012). We propose that embedding a simulation system such as *Prom Week*'s into a more traditional adventure game structure might increase the number of successful eureka games by letting more of the player's narrative plans be successful: rather than static, hand-encoded solutions to puzzles, encoding a simulation of relevant aspects of the story world allows unexpected plans to be carried out and responded to in a narratively sensible manner.

Similarly, we can discuss specific game and UI design decisions in the context of whether they help or hinder the eureka design pattern. For instance, some text-based storygame interfaces have given players a selectable list of actions, to eliminate the frustration of not knowing what to type to proceed. While reducing a particularly common failure case for eureka games (not know what to do next or how), it also deprives players the pleasure of thinking of the solution themselves. This is not to say choice-based interactive narratives are more or less "fun" or successful than similar games with an expressive input mechanic; just that each style of

game offers a different sort of pleasure: the former perhaps more concerned with flow and immersion in a story world, and the latter more with agency and player creativity.

References

- Bates, B. 1997. designing the puzzle . In *Proceedings of the 1997 Game Developers Conference*.
- Boutros, D. 2006. A detailed cross-examination of yesterday and today's best-selling platform games. *Gamasutra [Online]*.
- Buckles, M. A. 1985. *Interactive fiction : the computer storygame Adventure*. Thesis ph d –university of california–san diego 1985.
- Douglass, J. 2007. *Command Lines: Aesthetics and Technique in Interactive Fiction and New Media*. Ph.D. Dissertation, University of California Santa Barbara.
- Fernández-Vara, C. 2009. *The tribulations of adventure games: integrating story into simulation through performance*. Ph.D. Dissertation, Georgia Institute of Technology.
- Hocking, C. 2009. Fault tolerance: From intentionality to improvisation. In *Game Developers Conference (San Francisco)*.
- Hullett, K., and Whitehead, J. 2010. Design patterns in fps levels. In *Proceedings of the Fifth International Conference on the Foundations of Digital Games*, 78–85. ACM.
- Ingold, J. 2011. Thinking into the box. *IF Theory Reader* 229.
- Kreimeier, B. 2002. The case for game design patterns. *Gamasutra*.
- Montfort, N. 2003. *Twisty little passages : an approach to interactive fiction*. Cambridge, Mass.: MIT Press.
- Nelson, G. 1995. The craft of adventure.
- Pearson, C. 2012. Impressions: Prom week. *Rock Paper Shotgun*.
- Plotkin, A. 2011. Characterizing, if not defining, interactive fiction. In Jackson-Mead, K., and Wheeler, J. R., eds., *IF Theory Reader*. >TRANSCRIPT ON PRESS.
- Short, E. 2009. Puzzles. *Emily Short's Interactive Storytelling*.
- Smith, G.; Anderson, R.; Kopleck, B.; Lindblad, Z.; Scott, L.; Wardell, A.; Whitehead, J.; and Mateas, M. 2011. Situating quests: design patterns for quest and level design in role-playing games. In *Interactive Storytelling*. Springer. 326–329.
- Stephens, A. 2012. Prom week. *alastairstephens.com*.
- Tosca, S. 2003. The quest problem in computer games. In *Technologies for Interactive Digital Storytelling and Entertainment (TIDSE) conference, in Darmstadt*.
- Treanor, M. 2013. *Investigating Procedural Expression And Interpretation In Videogames*. Ph.D. dissertation, UC Santa Cruz.

³<http://www.ifcomp.org/comp13/games.php>