Cardboard Semiotics: Reconfigurable Symbols as a Means for Narrative Prototyping in Game Design

Rudy McDaniel
University of Central Florida

Erik Henry Vick
Stephen Jacobs
Rochester Institute of
Technology

Peter Telep
University of Central Florida

Abstract

In this paper, we propose the technique of cardboard semiotics. We explain the importance of symbolic analysis as a tool for building narrative prototypes in videogames. Borrowing from the participatory design work in the early 1990s, we suggest a means for adapting and extending this work based on the implicit participation of gamers' immediate-level stories (i.e., the gameplay with narrative implications). Our paper first introduces the concept of semiotics and explains how cardboard semiotics can function as an applied technique within the domain of videogame design and development. Next, we propose a theoretical basis for our work using a simple three act narrative structure and explore some basic concepts from narrative game design. Finally, we conclude with some simple examples of how cardboard semiotics might function in a design environment.

1. Introduction

In this paper, we examine semiotics as a tool for the rapid conceptual prototyping of narrative elements and gameplay in games. We call this concept *cardboard semiotics* because it involves the construction of a general framework with generic symbolic units that can easily be knocked down and built back up with new content as necessary. We use cardboard both as a metaphor for the process and as a nod to the participatory user-centered design processes followed with computer systems design in the early 1990s. For the sake of focus, we consider in this paper the types of games that are "strongly" narrative (e.g., RPGs and some FPS games) with detailed plots and characters that change over time, though we also maintain that these techniques are useful for other types of games as well.

Following this general idea of cardboard semiotics, "cardboard" units are filled in with interchangeable narrative and gameplay scenarios that meet the needs of particular symbolic functions. To explain how this process might work, we use this paper to outline some basic semiotic concepts and consider how these methods can be useful for improving the stories found in modern games. We suggest that although innovations in gameplay and game mechanics continue to push the cutting edge in game development, interactive narrative has not yet caught up, nor has the smooth integration of the two developed as a regular feature of games. This is in part due to the massive complications involved in trying to address what DeMarle [2007] describes as the immediate-level story, or the story that is crafted when the player engages with a game (as opposed to the high-level dramatic story outlined by the game's authors). This is of course somewhat of a "holy grail" challenge, since computers are nowhere near a human's ability to craft interesting real-time stories, though such stories can certainly emerge when humans play games together online. As Rouse III [2005] notes, a designer that truly cares about interactive storytelling must accept the fact that authorial control must be relinquished. This must occur in order to make the game flexible enough to tell the *player's* story as well as the *designer's* story.

We can parse work from other disciplines for some insight into this process. For example, narratology, or the science of story, has been recently applied to both games and interactive media in several scholarly works [Bateman 2007; Gordon and Iuppa 2003; Ince 2006; Wardrip-Fruin and Harrigan 2004; Sheldon 2004]. However, with the recent distractions in the field of interactive storytelling stemming from issues like the ludology vs. narratology debate [see Frasca 2003], it is no wonder that little work has been done in improving the *quality* of story and its integration into play in even AAA-quality commercial games. For example, *Fallout 3*, IGN's 2008 Xbox 360 Game of the Year, has a relatively bland high-level story and numerous problems in its immediate-level stories. One small example is the fact that NPC characters show only limited environmental awareness and do not react to events in the game that should be meaningful to them from a dramatic perspective. In *Fallout* 3's gameworld, an organization of NPCs known as the Brotherhood of Steel professes a hatred for super mutants, and yet when the hero just happens to show up with a super mutant as a member of her quest party, then the NPCs have no reaction to this development. This gameplay situation has dramatic implications, but they remain unexplored. Unfortunately, these types of issues are not yet resolved in many contemporary games.

In order to present game developers with additional, rapid choices for dealing with high-level storytelling, we modify the cardboard computing model of Ehn and Kyng [2003] to accommodate a mechanism for interchangeable storytelling and gameplay using semiotics. In essence, this involves the construction of a theoretical model in which *narrative symbols* are used as interchangeable placeholders for dramatic moments in a given gameworld. Following Crawford [2005], this addresses the issue that the fundamental quest in interactive storytelling is not the development of a central story*line*, but rather the creation of a suitable story*world* in which dramatic action can unfold. This world can then be given entirely different dramatic possibilities when a set of flexible narrative symbols is chosen and these symbols are manipulated when devising a suitable testbed for the game.

To clarify our model for cardboard semiotics, we will first review the concept of cardboard prototyping and some basic terminology from the field of semiotics and describe some ideas from this body of work. Next, we will construct a model for integrating semiotic placeholders as tools for preliminary storyboards that can later be fully developed into traditional storyboard sequences. This constitutes a move from the abstract domain of the *narrative concept* to the specific domain of a *narrative symbol* used to express that concept in the game. It also fits with existing methods of game design and physical prototyping (e.g., evolutionary prototypes, testbeds, and iterative design models – see Rollings and Morris [2004]) by allowing for a testbed of preliminary ideas which may or may not be incorporated into the final game. Finally, we will apply this model to an example in two different configurations in the final section of this paper.

2. Theoretical Foundations

Cardboard computing is an approach devised by Ehn and Kyng [2003] in which designers and users co-create interfaces through the use of reconfigurable cardboard mock-ups, sometimes augmented with additional, more primitive technologies (such as slideshow projectors). They claim four reasons for advertising such a methodology, noting that the mockups are cheap, understandable (with no confusion between the mock-up and the "real-thing"), fun to work with, and affording of hands-on, user-driven experience. As interactive gaming is by definition user co-created, we maintain that the same process can be beneficial to the creation of better stories in games. We extend this idea by using semiotics as a mechanism for generating narrative units in games. As Koster [2005] reminds us, games use puzzles as a significant part of their design, and much of the fun of gaming stems from us as pattern recognizers trying to find out how to assemble these puzzles into meaningful sequences to solve larger puzzles and/or assemble a coherent narrative. In much the same way, we can use semiotics as a means to reverse engineer dramatic puzzles in order to find the most compelling narrative patterns in order to guide the player through the process of putting a particular dramatic occurrence back together.

Videogame designers often use variations of the cardboard computing methodology to test mechanics and formal elements of the games they are developing before opening the editor to start the coding process. Fullerton devotes a full chapter to Physical Prototyping in her text *Game Design Workshop: Second Edition* [2008]. In addition, Buchanan has been researching and promoting a hybrid of cardboard computing in a digital sandbox that he calls "Game Sketching" [Buchanan et al. 2007]. These methods all speak to the need to develop gameplay and narrative elements well in advance of pursuing the actual digital development of the game itself. No matter what the applied methodology of narrative and gameplay design, the authors believe that the use of semiotics can greatly inform the process.

In terms of the "content" used in our cardboard mockups, we suggest using semiotics as a generative mapping device for narrative possibilities. Simply put, semiotics is the study of signs and symbols. Chandler [2007] explains that signs "take the form of words, images, sounds, odours, flavours, acts, or objects, but such things have no intrinsic meaning and become signs only when we invest them with meaning" (13). Because of the breadth of potential choices for symbols and the apparent arbitrariness of their meaning-making relationships with real world concepts, much literature on the subject is riddled with ambiguity, enigma, and argument. Different approaches to semiotics abound, as do differing formulations of how exactly the relationship unfolds between an author, her chosen symbol, the concept that symbol represents, and the way that symbol is interpreted by an audience. Well known semioticians include Ferdinand de Saussure, Charles Peirce, Roman Jakobson, Louis Hjelmslev, and Umberto Eco. In his book *A Theory of Semiotics* [1976], Eco maintains that the study of semiotics concerns "anything that can be taken as a sign" (7) that it is the "discipline studying everything which can be used to tell a lie" (7) and that the objects we see and recognize as ordinary forms are only the surface appearances of the more complex networks of underlying elementary units. Since much of gaming often involves a willing suspension of disbelief on the part of the player, Eco's conceptualization of semiotics as a tool for telling lies is particularly compelling as an argument to persuade game creators of its validity.

While interesting, much of this history and theoretical posturing seems somewhat abstract and detached from the practical and applied techniques of videogame development. We can, however, see some use in adapting the basic terminology and concepts from this field to our present consideration of better narrative development in games. To begin with, we can consider the difference between a game concept and the symbol or symbolic grouping of content used to communicate that concept. An understanding of semiotic analysis is useful for that task.

From a very general perspective, semiotics as a field is concerned with distinctions between a symbolic *signifier* and the idea or concept to which that signifier refers, which is known as the *signified*. Under this construction, it is clear that the relationship between the signifier and the signified is somewhat tenuous (as

Eco [1976] warns earlier in this paper), and that various people will use arbitrarily defined signifiers to refer to the same signified concepts. One obvious example of this is language itself, which is obviously distinct according to culture, but which still refers in essence to the natural world and to humankind's relation to this natural environment and to one another. As such, our ability to understand and manipulate the symbolic nature of information has become a marketable job skill in the modern economy. Robert Reich's *The Work of Nations* [1991] is a well-known text that speaks to the necessity of "symbolic analysts" who contribute not to material goods of the economy, but rather to "manipulations of symbols – data, words, oral and visual representations" (177). As professionals working in a multidisciplinary, rapid-paced field that is constantly changing and evolving, game designers are usually by necessity skilled symbolic analysts.

As an established strategy for considering representational media, it is not surprising that semiotics has previously been linked to pursuits in game design. Salen and Zimmerman [2004] note that games can *represent* meaning, but also that they are *representations of* meaning. They represent meaning through their symbolic depictions of "characters, stories, settings, ideas, and behaviors" and are representations of meaning when "we consider them as representational wholes" (364). With this duality there is a potential for incongruence. A game may succeed at representing narrative elements when those elements are considered independently, but fail when these disparate narrative components are considered in their entirety as a single representational unit or overall overarching plot. The fact that games' representations happen with interaction from the player, and often as a result of these interactions, complicates the semiotic process even further. As Salen and Zimmerman explain, these relationships between characters, events, and environments are at least as complex as those which occur when a reader immerses herself in a good book.

An important goal in the pursuit of a semiotic methodology for game designers is to articulate some of these symbols that are important for both practitioners and theorists. Fortunately, prior work presents some common symbols that are of use to us during story development. For example, on a practical level, character archetypes first introduced by Jung and applied to mythological structures by Campbell [1949] are examples of semiotic symbols that can be used to define pieces of plot and/or gameplay (Hero, Mentor, Threshold Demon, etc.). For theorists, Myers [1999] has performed a similar semiotic analysis considering the differences between algorithmic and experiential simulations and comparing theories of play to theories of simulation.

This very brief overview of cardboard computing and semiotics introduces the framework we will use to apply our ideas for modular and interchangeable narrative prototyping for games. In the next section, we consider a simple arrangement upon which to place narrative symbols according to a particular structure that suits the dramatic needs of a gameworld.

3. A Simple Three Act Semiotic Structure

Using a symbolic-analytic approach, we can devise a base semiotic structure within which to define narrative symbols for games. One simple possibility follows narrative structures outlined by Aristotle, Campbell, Field and others and was theorized initially by Freytag [see Jacobs 2007] in which stories are broken down into three act structures. Here, a system follows in which Act I introduces the hero and takes up approximately 25% of game time for the primary quest. Act II is the bulk of the game at 50% and constitutes the hero's trials and tribulations as she moves towards the narrative climax in the game. In Act III, the tension is resolved through the player's actions and the endgame occurs. This also constitutes 25% of the game. These three acts contain the major plot points for our abstract interactive story.

At this point, we can proceed literally following the work of Ehn and Kyng [2005], such as by building a tri-fold poster board capable of displaying interchangeable symbols for each dramatic act. This approach may be valuable simply in bringing people together to share ideas about the story and co-create the narrative in a shared physical environment. This method for visualizing , analyzing, and making structural changes in story is often used in film, especially animated film, in which storyboarded sequences of the entire film are used for discussion and illustration of points. Or, in a fashion more likely to be feasible in modern development processes, the chart can be deconstructed and broken down into individual units for consideration during meetings or via online discussion. What is important here is that the story be given the same organic treatment as the gameplay, as is ensured when an iterative design or rapid application development process is used during production. If a particular narrative symbol is not a powerful factor in the evolution of the plot or does not contribute to a better understanding of a particular character or her growth in the game, it should be replaced early on in the testbed, just as an incompatible or unpleasant gameplay mechanic would be discarded or refashioned into something useful.

In some instances, then, the overall backbone or overarching plot for the narrative structure is not as important as the narrative placeholders in which semiotics can be applied. For example, the three act structure for game narrative is a very rudimentary adaptation of the classical Freytag Pyramid structure [Freytag 1900] which is over a decade old and itself stems from Aristotle's centuries-old *Poetics*. More suitable plot structures are found in works such as Ince [2006] in which he outlines various interactive story structures such as:

- linear narratives (plot points in a linear sequence, as we describe in the three act example above),
- linear story with non-linear gameplay (plot points in a sequence, but multiple ways to get there – DeMarle [2007] calls this technique "gated storytelling"),
- branching stories (one initial plot point leads to several branching hierarchies of plot points), or

89

- parallel stories (one initial plot point branches to two series of plot points, which each proceed linearly).

Admittedly, some of Ince's categories overlap to an extent, but again, it is not the underlying structures which are important, but rather the technique we apply to each narrative plot point.

We can perhaps proceed most easily in explaining the cardboard semiotics concept by using a simple example. Returning to our base three act structure for game design, we can assign placeholder events to each particular point in the structure. Let us consider Event 1 to represent the introduction of the hero. Event 2 will represent the hero's final and most ambitious battle. Event 3 will represent the hero's final fate as evidenced by the dramatic conclusion to the story. Collectively, these three events represent the high-level story for our game. We must then define our primary symbols (high-level plot points, playable characters, and environmental locations) and then the supporting symbols that connect the immediate-level story to the high-level story.

We might consider some guiding questions to help generate our primary symbols. Following a semiotic approach, then, involves the asking of these questions in relation to the high-level story:

- What is the dramatic purpose of this symbol?
- What in-game actions, environmental effects (art, particle effects, and sound effects), and NPC behaviors can help strengthen this symbolism as the symbol evolves during gameplay?
- What connotations exist as the result of this symbol? How can these expectations be strengthened or minimized throughout the rest of the game?

Returning to our *Fallout 3* example from earlier in the paper, we can situate the Super Mutant party member as a narrative symbol. This symbol produces meaning when placed in a procedural role in the game. For example, one dramatic purpose of this symbol inside *Fallout* 3's gameplay is to reflect an unexpected use of character in the story, namely that a bestial, mutated character can in fact display some remembrance of its humanity and contribute positively to the party. The actions and effects that strengthen this symbolism include all of the actions this NPC exhibits that contradict what the player initially knows about Super Mutants (that they will destroy all humans on site and exhibit only the most primitive urges to hunt and feed). However, the positive gains from this positioning are at once lost when other human NPC characters in the game (the Brotherhood of Steel) do not react to this unusual circumstance, thus weakening the overall story and the symbolic usefulness of this dramatic character.

Because of this capacity for trouble when moving a narrative symbol into a procedural act, a second level of semiotic analysis is necessary. This involves considering each symbol not only in terms of the overarching story, but also in terms of the other narrative symbols which already exist. In this case, it would mean recognizing that the Super Mutant symbol needs to be better

aligned with the Brotherhood of Steel symbols in order to better support the existing narrative atmosphere and to remind the player of the unique circumstances in which she is playing.

This is just a simple example. To adopt a semiotic approach in more detail, we must consider the salient symbols present in the immediate-level story. This is the narrative possibility space surrounding each of the high-level narrative plot points. These heuristic questions are even more direct:

- Which symbols should be included in each Act?
- What do these symbols denote?
- What do these symbols connote?
- How do these symbols contribute to the high-level story?
- How do these symbols relate to other symbols?

With these questions in mind as guiding principles for a basic high-level story (remember, symbolic mappings can be quickly changed to generate "innovations" in high-level story based on a primary template and some sort of equivalency table), one can set about moving from dramatic to ludic space in the immediate-level domain.

4. From Dramatic Structure to Game Structure

Once we have developed the high level story sufficiently (and in this sense, we are not limited to formal narratives) we must move towards designing an experience based around the message the story conveys. To do this, we need to map the existing dramatic structure onto a structure that facilitates gameplay.

Salen and Zimmerman [2004] define gameplay as the navigation of a suite of choices, where each choice leads to an action that has a discernable outcome and ultimately leads the play to the next step in the critical path of the game. Further, if we examine the play of a game across the dimension of interactivity, we can view the game in three distinct ways:

1. As a composition of small, game events couched in larger game units
2. As a composition of these large game units
3. As the game as a whole.

These three views allow us to take a modular approach to game design and to compose the following game structure:

1. Game exposition – the introduction of the game as a whole
2. Game problem setup – identification of the termination conditions of the game's primary plot problem
3. Game Unit description (repeat for all units)
   a. Game unit exposition
   b. Game unit problem setup

c. Game event (choice) description (repeat for
          all events in the unit)
                i. Event exposition
               ii. Provide direction towards solutions
              iii. Elicit choice / action
               iv. Discernable event outcome
       d. Discernable outcome for the game unit
    4. Discernable outcome for the game problem

This structure is very similar to the dramatic structure proposed above, and provides a roadmap for combining the high-level dramatic elements with immediate-level game events and game objects. Using this structure, we can use the high level descriptions of the three acts in the preceding sections to describe our overall game and begin to create our explicit structure:

    1. Game Exposition – introduction of the game world, definition of the setting
    2. Game problem setup – the hero's nemesis acts in such a way as to provide cause for the final battle (end of act II)
    3. Game Unit 1: Introduction of the Hero
    4. Game Unit *n*: Hero's final battle
    5. Discernable outcome for the game problem: Hero's final fate.

Of course, any real game will likely have more than two game units. Using this cardboard semiotics concept allows us to play with various plot points – combining them into units, reordering them to create different units or alter the flow of the game, elevating any particular plot point to become the defining problem of a game unit itself, and so on. In this manner, we can develop a full critical path from a simple three act dramatic structure.

For example, using the basic narrative from the preceding section, a plot point may be defined as "finding suitable companions to aid in the quest." Using this as a basis, we can replace the entire plot point with boxes (placeholders) that match the game unit structure suggested above. In other words, we need a unit exposition box, a unit problem box, some number of game event / plot point boxes, and an outcome box:

    1. Hero discovers he needs help to complete the quest.
    2. Hero must find the best companions that match his character and style.
    3. …various plot points…
    4. Hero moves to the next unit with his companions in tow.

This process is designed to be very simplistic. Keeping these high-level box descriptors simple allows us to mix and match with other like-function boxes to create new units and twists to the story. For example, using cardboard semiotics, we can replace the exposition box above with any of these expositions below:

    • Hero becomes injured and can't complete a task

    • Hero discovers his nemesis has 3 bodyguards
    • Hero is given multiple tasks of equal importance all with a similar time limit.

Similarly, we could replace the unit problem box with any of these:

    • Hero must choose the lesser of evils and team up with a villain
    • Hero must protect three young children, each of which has a special ability he does not have.
    • Hero discovers five teenagers following him and imitating his actions.

By mixing and matching, we can try various game units without a significant increase in development or design costs. Once we have decided on the final configuration, we can simply refine the concepts in each box to near-final versions. For example, using our original set of boxes for this level:

    1. Hero is given a quest by a broken, old beggar. The beggar's body is twisted and his outbursts of ranting indicate his mind is twisted as well. The beggar tells the Hero that he was an aspiring hero once, and that he had faced a great evil. He goes on to say that he was blinded by pride and entered the battle alone. He motions at his broken body and mutters "That was the last time I was whole." He screams and begins to mutter. Further conversation is impossible.
    2. The Hero glances around and sees a few people looking his way. Some stand in the shadows, some stand boldly in the light, staring at him openly.

We can then define various game events that lead the Hero to successfully ally with some and not with others. The resolution box ultimately depends on the game events that occur, so we can leave that as an exercise for the reader. Our primary task in creating game events to flesh out the levels is somewhat different than that of creating plot points in a narrative, given that players must have enough freedom to choose their own actions and solutions to problems. However, given our approach to cardboard semiotics outlined above, creation of game events simply becomes an act of replacement and refinement.

Simply put, we may take any particular plot point and deconstruct it into an expository box, a directional box, a choice/action box and an outcome box. For example, given the developing story outline for the preceding section, a plot point may be that of "procuring transportation". We may use cardboard semiotics to replace this plot event with the following four boxes:

    1. Hero needs to travel a great distance.
    2. Hero is under time pressure, and has a moral choice to make.

3. Hero may do nothing, steal, or obtain a slow form of transportation at great cost.
4. If the Hero does nothing he advances to another plot line, closing this line for the present. If the Hero steals, discernable changes to his character status must be made. If the Hero takes the honest, but slow form of transport, time pressure must mount, and changes to his character must be made.

We can continue down this path, picking symbols and representations that further elucidate the event. For example:

1. The Hero trips over a cobblestone and falls. When he stands and dusts off his knees, he sees the edge of a map under the stone. He examines the map and sees a path leading to his ultimate destination. A time, very near in the future, is scribbled next to the destination.
2. The Hero hears a car horn behind him. He also hears the sound of a horse at a slow walk somewhere to his left. As he stands there, a passerby glances at him meaningfully and whispers "Get a move on, Chum."
3. As the player turns around, a man gets out of a car behind him. Leaving the motor running and the door open, the man runs towards a horse stable on the side of the road. Near the doorway to the stable, a sign reads: "Horses for sale! Today only! Ask inside!"
4. If the player turns and leaves the area, the map crumbles to dust, accompanied by the sound of a mournful bell tolling once. If the player jumps into the car and drives off, people on the street turn and watch. Some glare, some avert their eyes, and some show a hand sign meant to ward off evil; however, the car moves very quickly and he rapidly leaves the people behind. If he chooses to buy a horse, he must negotiate a high sales price, but on mounting the horse, passersby smile and wave at him.

In this manner, we can turn simple, generic plot points and other dramatic elements into a near-production quality critical path and game description. By using cardboard semiotics, we can structure plot points into game events or game units.

5. Conceptual Possibilities / Visual Aids

The process above is one such way to prototype some possible stories and critical paths using cardboard semiotics. We could also consider the problem from a production perspective by using particular mapping structures as cognitive aids or visual aids to help the team during brainstorming. For example, assuming our goal is to create an innovative new story for a First Person Shooter (FPS), we can begin by defining our primary symbols in a visual sequence as a chart or diagram. We might start with a basic set of generic symbols: one playable hero character, one master villain, three environmental locations, and a basic plot to overthrow the villain. The rest of the story depends on our

manipulation of these primary symbols and our filling in of generic placeholders with particular instances.

We can then develop the following hierarchy of symbols. Each environmental symbol is sustained by character and object symbols which constitute its overall effect on the player's interpretation of the game story. In essence, each of these sub-symbols helps to generate the player's immediate-level story as they visit that location. In Figure 1, we have created a "saloon" symbol as a visual aid which would represent a saloon location in our FPS. The saloon environment is populated by eight other symbols – NPC symbol relationships are designated by normal lines, while object relationships are designated by dotted lines. Consider the various permutations afforded by this particular configuration (see Table 1). The symbolic structure shown generates an 8x4 grid, each symbol on a new row with three placeholders, and each placeholder populated by an additional symbolic reference. Collectively, each sample arrangement below contributes to a different narrative outcome in the game. From that initial chart, each configuration is instantiated for n number of cases as devised by the game designer. These symbols can then be further examined for dramatic power and potential gameplay fun in the same fashion as the example we considered in section 4.
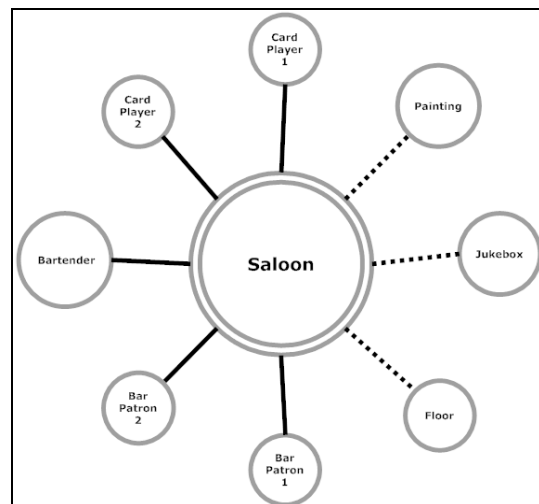

Figure 1: Saloon Symbol

Symbol	Instance 1	Instance 2	Instance 3
Bartender	Grizzly	Clean-Cut	Alien
Card Player 1	Shark	Mentor	Villain
Card Player 2	Love Interest	Sleeping	Alien
Bar Patron 1	Sleeping	Chatty	Absent
Bar Patron 2	Drunk	Furtive	Insane
Painting	Tumbleweed	Black Spot No 2	The Scream
Jukebox	Shot Up	Classy	High-Tech
Floor	Sawdust	Wood	Marble

Table 1: Symbol Instances

From this conceptual model, more elaborate physical mockups (perhaps using a tabletop model or roleplay scenario) can be constructed as visual aids that will assist the game designer in understanding what the signs are and what they need to look like for a given ludic or narrative moment in the gameworld. If a particular sign does not meet the needs of a level or dramatic plot point, it can be polished, reimagined, or deleted without requiring a significant amount of additional development work.

6. Conclusion

In this article, we suggested a theoretical construct for a method of game design that is based on using interchangeable narrative symbols. Using a methodology we call cardboard semiotics, we explained how a series of guiding questions can be used to consider the relationships between immediate-level and high-level storytelling in gameworlds, and further, how those relationships can be expanded into functional game descriptions and critical paths. We think this is significant because it capitalizes on the importance of the human element in game design – human creativity (for coherent narrative drama) is thus far unchallenged by computational algorithms. Future work in this area will involve the testing of this methodology to game design situations in which students produce original games that should break out of existing clichéd narratives and stand on their own as unique creative contributions to the field.

References

BATEMAN, C. (Ed.). 2007. *Game Writing: Narrative Skills for Videogames*. Boston: Charles River Media.

BUCHANAN, J.W, AUGUSTIN, M CHUANG, G DELGADO, A, ORTEGA, A, AND SEAVER, J. 2008. Game Sketching. *Proceedings of the 2nd international conference on Digital Interactive Media in Entertainment and Arts.* ACM.

CAMPBELL, J. 1949. *The Hero with 1,000 faces.* Boston, MA. Pantheon Press.

CHANDLER, D. 2007. *Semiotics: The Basics*. New York: Routledge.

CRAWFORD, C. 2005. *On Interactive Storytelling*. Berkeley, CA: New Riders Games.

DEMARLE, M. 2007. Nonlinear Game Narrative. In C. Bateman (Ed.), *Game Writing: Narrative Skills for Videogames*, Boston: Charles River Media, 71-84.

ECO, U. 1976. *A Theory of Semiotics.* Bloomington: Indiana University Press.

EHN, P., AND KYNG, M. 2003. Cardboard computers: mocking-it-up or hands-on the future. In N. Wardrip-Fruin and N.

Montfort (Eds.), *The New Media Reader*, Cambridge: The MIT Press, 651-662.

FRASCA, G. 2003. Ludologists love stories, too: notes from a debate that never took place. *Levelup 2003 Conference*, from www.ludology.org/articles/Frasca_LevelUp2003.pdf.

FREYTAG, G. 1900. Technique of the Drama: An Exposition of Dramatic Composition and Art (E. J. MacEwan, Trans. 3rd ed.). Chicago: Scott, Foresman and Company.

FULLERTON, T. 2008. *Game Design Workshop:Second Edition: A Playcentric Approach to Creating Innovative Games.* Burlington, MA: Morgan Kaufmann.

GORDON, A. S., AND IUPPA, N. V. 2003. Experience Management Using Storyline Adaptation Strategies. *Proceedings of the 1st International Conference on Technologies for Digital Storytelling and Entertainment*, Darmstadt, Germany.

INCE, S. 2006. *Writing for videogames*. London: A&C Black.

JACOBS, S. 2007. *The Basics of Narrative*. In C. Bateman (Ed.), *Game Writing: Narrative Skills for Videogames*, Boston: Charles River Media, 25-42.

KOSTER, R. 2004. *A Theory of Fun for Game Design.* Phoenix, AZ: Paraglyph.

MYERS, D. 1999. Simulation as Play: A Semiotic Analysis. *Simulation & Gaming*, 30, 2, 147-162.

REICH, R. 1991. *The Work of Nations*. New York: Alfred A. Knopf.

ROLLINGS, A. & MORRIS, D. 2004. *Game Architecture and Design: A New Edition*. Berkeley, CA: New Riders.

ROUSE III, R. 2005. *Game Design Theory and Practice* (2nd ed.). Plano, TX: Wordware Publishing.

SALEN, K. AND ZIMMERMAN, E. 2004. *Rules of play: Game design fundamentals*, Cambridge, MA: The MIT Press.

SHELDON, L. 2004. *Character Development and Storytelling for Games*. Boston: Thomson Course Technology.

WARDRIP-FRUIN, N., AND HARRIGAN, P. (Eds.). 2004. *First Person: New Media as Story, Performance, and Game*. Cambridge: The MIT Press**.**