# Historical Decisions Framed in Immersive Digital Environments

**James Creel, Alexey Maslov, Adam Mikeal, Colin Speight**
Computer Science Department
Texas A&M University
{jsc6064, alexey, adam, colin}@cs.tamu.edu

**ABSTRACT**
New media refers to the new realms of expression people enjoy through the use of automated symbol processing machines and their interfaces. Authors have argued much about the roles that conventional analysis of literature, games, radio, television, and film will play in these new realms. Computer games and other interactive simulation are a distinct form of media that affords strange new powers to authors while presenting multiform challenges. The most immersive of interactive simulations include within them aspects of narrative and agency, which entail allusions to entities and events outside the simulation world. Such representational links provide an effective means for engagement with the real world. This could take the form of education, collaboration, or experimentation in simulated space with external implications. Military training has employed this approach. Games programmers have pursued this route with great success. Another obvious application of this approach would be to the study of history. In this paper, we describe an interactive three-dimensional environment for learning about and experimenting with Prospect Theory, a theory of decision making useful in the political and historical sciences. The environment exists within the Neverwinter Nights game engine. The vuser interacts with multiple agents, whose dialogue and action are defined in the NWScript language. The scenarios, which attempt some degree of historical accuracy, are designed to present historical decision points that political or military leaders experienced. By bringing about these decisions, the vuser experiences a sense of agency. In addition to entertaining and teaching about historical circumstances, the scenarios can evaluate hypotheses about decision making. We demonstrate how hypotheses can be tested with respect to Prospect Theory. We give as an example scenario The Second Punic War, in which historically inspired dialog immerses the vuser by framing a decision problem.



**Keywords**
Neverwinter Nights, Computer Gaming, New Media, Prospect Theory

## INTRODUCTION

Computers have provided artists with tools for conveying meaning through a variety of new media, such as hypertext, hypervideo, and video games. Inevitably, such new media, which currently exist in a more or less incunabular form, are inspired by more established forms. For example, video games often borrow stylistically from motion pictures. Some hypertextual fiction employs post-modern literary traditions.

It is useful to distinguish between narrative and non-narrative media, though such a distinction may not be absolute. The examples of new media cited above tend to employ narrative structures. In contrast, a telephone conversation tends not to be structured as narrative. One may certainly convey narrative over the medium of telephone lines, but the typical phone call is not intended for storytelling, but rather the expression of immediate facts or emotional attitudes. How such an analysis applies to transmission of packets of movies, online games, and music over such telephone lines must be investigated in later work. We intend here to merely point out the diversity existent in uses of media, some of which are purely utilitarian, and others which convey ideas about the human condition. Such ideas may be general in nature, but are conveyed by specific means; that is, such ideas (like their purely utilitarian brethren) are described through specific language or semiotic expressions.

The distinction between utilitarian and humanist ideas is similar to that between game and narrative, in the following sense: humanist ideas appear in all narrative, and games employ a purely utilitarian mathematics. Yet under close analysis, these apparently distinct ideas themselves are not easily separable. Indeed, such a separation is sometimes discouraged. Playing the devil's advocate in [Wardrip-Fruin p 2], Janet Murray asks the motivating questions "Why are we particularly drawn to discussion of digital games in terms of story? And why is so much storytelling going on in electronic games?" She points out that games and stories are similar in that they are both easily conveyed

through the medium of the computer, and that they both include the elements of contest and puzzle. She observes that in the postmodern world "everyday experience has come to seem increasingly gamelike, and we are aware of the constructed nature of all our narratives." She refers here to signs and cultural constructions that constitute our narratives. Yet such subjective constructions seem antithetical to the pure abstract logic of the game. Through this dialectic, we arrive at the point where all the world is a game, as well as a stage.

As a reductionist, Herb Simon [Simon] may have argued that cultural constructions can be described in terms of mathematical physics. Such an interpretation accords with Murray's dialectic, in which the game (mathematics) seems to subsume subjective cultural experience. Simon would propose a simulation, by which cultural constructions (or rather, abstractions thereof) could be understood in terms of mathematical primitives. However, Simon recognizes the practical futility of accounting for every aspect of something as complex and multi-leveled as culture in one's first or even subsequent approximating models, and thus he proposes techniques for mitigating the error that results from incomplete models. By accepting a weak interpretation of Holism [Smuts], he acknowledges that complex systems produce emergent properties that do not result from their components in isolation. By dealing with emergent properties and not dealing with every component that produces emergent complexity, one can feasibly build a more or less accurate simulation of such a system. Simulation, on this view, may be effectively applied to any system of interest, be it mathematical, physical, or cultural. Importantly, simulation can provide new knowledge and test assumptions about well studied systems, but can also provide new knowledge about poorly understood systems when the details are abstracted. Thus, the subject matter of narrative, that is the human condition, may be amenable to simulation.

However, as ludologists like Markku Eskelinen [Wardrip-Fruin p 36] and Espen Aarseth [Wardrip-Fruin p 45] would have it, simulation is contrary to the aims of conveying knowledge through narrative. As Eskelinen derisively remarks, narrative in popular thought is distinct from game: "If I throw a ball at you, I don't expect you to drop it and wait until it starts telling stores" (p36). Aarseth also assumes a conflict between interactivity and narrative, or at least textual forms: "Are games texts? The best reason I can think of why one would ask such a crude question is because on is a literary or semiotic theorist and wants to believe in the relevance of one's own training" (p 47). Aarseth goes on to acknowledge that games include a material/semiotic system or gameworld, but dismisses this as incidental to the game's mathematical rules and state space, with the conclusion that games are not intertextual. However, the progenitor of the field of ludology, Gonzalo Frasca [Wardrip-Fruin p 85] finds that computer games and electronic agents should be constructed for social contexts and with an audience in mind so that "they may actually get across the message for which they have been designed." Thus, even as ludologists reject a conflation of game and narrative, some accept the semiotic hermeneutics of games.

The idea of semiotic interpretations of art is nothing new. However, it leads to certain conclusions eschewed by ludologists. Aarseth seems to reject the notion of multiform interpretations of stories: "In a (Western) world troubled by addiction, attention deficiency, and random violence, stories are morally and aesthetically acceptable. In stories, meaning can be controlled" (p 45). On the other hand, Umberto Eco describes an element of multiplicity in art, including literature [Eco]. Under his semiotic theory, the reader of a story, such as The Garden of Forking Paths [Borges], does indeed experience a variety of storylines through literary response. Artists and authors knowingly provide their media to the public with the expectation that vusers will interact with the work through response, producing novel and unexpected extensions to the work. Such arguments apply to such static media as novels and paintings. Importantly, the author of a simulation has the ability to make such interactive response explicit.

The narrative aspects of simulation are debatable, depending on one's definition of narrative: the more restrictive the definition, the less overlap one finds. Under any reasonable definition, game and story are distinct, but share aspects. Inevitably, the purely mathematical constructs of games find meaning through semiotic and sensory interpretation. Gonzalo Frasca [Wardrip-Fruin p 85] finds that simulation (like drama) can serve to convey well developed political or social meanings if vusers are encouraged to critically reinterpret media, although it is worth noting that he finds simulation (or at least video games) unsuitable for historical events [p 86]. Simon Penny [Wardrip-Fruin p 73] argues that simulations facilitate habitual behaviors, implying a moral responsibility of game designers..

Though simulated worlds offer greater versatility in narrative forms, this versatility conflicts with the revered linear narrative structure of what Perlin calls "The Novel." However, as Bryan Loyall in [Wardrip-Fruin p 2] points out, interactive drama, whether portrayed for the participant by persons or artificial agents, can ensure some linearity in interactive narrative. The actors or agents should respond realistically to the participant's unpredictable behavior while providing subtle cues that lead the partipant to bring about lead a rising action, conflict, and resolution. Such methods lead us closer the a genre of "Cyberdrama," a term that Janet Murray reluctantly adopts in [Murray] and [Wardrip-Fruin p 2].

Sometimes, the subtle cues of plot need not be so subtle. In [Wardrip-Fruin p 302] Jill Walker outlines her experience with Online Caroline (http://www.onlinecaroline.com), in which she experienced engagement with and immersion in the simulated story-world, despite a lack of true agency. The apparently interactive Caroline undergoes the same basic course of

events regardless of the vuser's specific comments and interactions, although these are used to make the text more compelling. Regardless of heartfelt advice or earnest urging, Caroline descends into an abyss.

While narrative may describe fictional or factual events, all narrative indirectly conveys symbols of the human condition. Joseph Campbell [Campbell] identifies the "monomyth" of the hero quest, which structure is duplicated in all ancient mythologies, and more loosely by narrative in general. Carl Jung [Jung] points out that the trials of the protagonist in the quest for enlightenment mirror the development of the human psyche including the differentiation of the ego from the self (individuation) and the ego's subsequent reconciliation with the unconscious aspect of the self. Ken Perlin in [Wardrip-Fruin p 12] says of the protagonist that "His conflict becomes our conflict, his choices our choices, and his fictional changes of character seem, oddly, like a sort of personal journey for our own souls."

The universality of narrative structure affords educational and entertaining interactions. In addition, the versatility of new media offers novel challenges and opportunities for the creation of narrative. As the fields of computer hardware and HCI advance, one can imagine a synthesis of media that approaches actual reality in its degree of immersion and agency – an ultimately hyperrealisitc medium, to use the vocabulary of Baudrillard [Baudrillard]. The medium that achieves this effect most closely at the time of this writing is the interactive three-dimensional environment. Current graphics and artificial intelligence allow for the production of simulated worlds that offer a taste of the immersion and agency of actual reality. Such simulated worlds may attempt to model or represent reality as closely as possible (for some limited domain), or may represent fictional fantasy.

## AN INTERACTIVE HISTORICAL ENVIRONMENT

Our work is concerned with using the medium of the interactive three-dimensional environment in order to give students, scholars, or gamers an opportunity to learn about and experiment with complex historical settings and political theories in a multi-agent, immersive, transformative setting. History can be a study of broad generalizations or fine details. Yet a complete historical understanding requires a synthesis of these perspectives. The medium of the interactive three-dimensional environment is ideal for such a synthesis, because the agents that populate such a simulation can communicate to the participant/actor details about their simulated or fictionalized daily lives, but also the great important events of their time. Furthermore, the settings of such encounters may simulate the architectures and styles of the era under examination, furthering the sense of texture and immersion.

We plan to investigate the predictions and properties of Prospect Theory [Levy][Tversky][Mintz] in our simulated world. The player/participant can freely travel in a historical setting, playing the role of a great leader. The player can gather information from the agents populating the world, thus "framing" some historical decision making problem.

The scenario develops to a moment of climactic choice, when the player must choose a course of events that may or may not coincide with actual history. One expects the player's choice to coincide with historical events at least in those cases that are accurately explained by Prospect Theory.

The basic prediction of Prospect Theory is that when the problem is framed in a positive manner, in which the actor perceives a likelihood of gain or profit, the actor will be averse to risk. On the other hand, if the framing presents a domain of loss, the actor will be more willing to take on risk.

For development, we have chosen the Neverwinter Nights world creation engine because if it's Aurora world editing toolkit and rich control over branching dialog through NWScript, which will give some appearance of intentionality to the agents in our simulation. We expect that this framework will offer the capabilities of the Decision Board (http://www.decisionboard.com/academic) software that Adam [Mikeal] has used to investigate Prospect Theory in the past. In addition, immersion in a three-dimensional world and interaction with apparently intelligent agents should make our theoretical predictions more accurate, since the participant will be more inclined to identify with the scenario and the agents involved. Like the Decision Board, our interactive framework is appropriate for a variety of serious applications. Clearly, it could be used for research in testing political or human decision-making theories. In addition, it could teach political or historical ideas more effectively than merely textual interfaces. Eventually, the system could be used for training about decisions in crisis situations or in analyzing the risks of certain scenarios. For now, we keep the investigation historical since the detailed records available will facilitate development.

We investigate the decisions faced by Carthaginian general Hannibal Barca in the Second Punic War of 218 B.C. To understand the historical circumstances of these decisions, we must consider the historical record of preceding events. The states of Rome and Carthage had had diplomatic relations since one year after the founding of founding of Rome in 507 B.C. Polybius [Polybius] recounts a treaty of ostensible friendship from 508 B. C. in which the Romans and their Italian allies were assured of protection from Carthaginian conquest in exchange for adherence to conditions protecting Carthaginian trade and commerce. In particular, Roman craft could not sail west past a North-South line to trade in the western Mediterranean. At this point in time, Carthage appears to have had the upper hand, with wide control of territory in North Africa and the Western Mediterranean, whereas Rome did not control even the Italic peninsula. Polybius recalls a second friendly treaty between the states that differs primarily in the

addition of a new no-sail zone. Finally, Polybius recounts a third Roman-Punic treaty that was drafted around the time Pyrrhos – a mutual enemy - had invaded the Italic peninsula. From Polybius 1979, III.25:

"If the Romans or the Carthaginians make a written alliance against Pyrrhos … they may help each other in the land of the party on whom he is making war. Whichever party may need help, the Carthaginians shall provide the ships both for the transport and for operations, but each shall provide the pay for its own men. The Carthaginians shall also give the Romans help by sea if need arises, but no one shall compel the crews to disembark against their will."

This treaty set the stage for the First Punic war in 264 B.C. The ostensible reason for war appears avoidable, indicating that tensions between the states had grown over time, and conflict had become inevitable.

In 284 B.C. King Agathocles of Syracuse sent Campanian mercenaries known as the Mamertines (Sons of Mars) to make war on Carthage in Sicily. After they were discharged, the treacherous mercenaries took the city of Messana on the Sicialan straits, whereupon they proceeded to plunder the surrounding districts. Agathocles's successor Hieron II endeavoured to expel the mercenaries, who requested assistance from both Rome and Carthage. A Carthaginian garrison was defeated by a consular army under A. Claudius Caudex, leaving Rome in control of Messana. The powers were thus at war, and Rome intended to take the whole of Sicily. The geography of the conflict necessarily made naval action of decisive importance, forcing Rome to produce 20 triremes and 100 quinqueremes for her first adventure at sea. Roman victory, however, was not the result of superior seafaring, at which the Carthiginians excelled, but rather hand-to-hand combat, which they forced by boarding the Carthaginian vessels. After the defeat of the Punic navy in the battle of the Aegadian islands on 10 March 241 B.C, Rome emerged the victor of the First Punic War.

What followed was a punitive treaty that some have compared to the treaty of Versailles after World War I, in that it set the stage for future conflict. Carthage was expelled from Sicily, and forced to pay a great sum of gold up front and over time. To make matters worse, Rome repeatedly violated or altered the terms of the treaty, demanding more territory and gold. During this time, however, Carthage was rebuilding her commercial empire, under the auspices of Hamilcar Barca and his son-in-law Hasdrubal in Spain. A Roman delegation met with Hasdrubal to form a treaty that the Carthaginian military would not cross the river Ebro. Ironically, it was Rome who invaded an area south of the Ebro in 217 B.C. In retaliation, Hannibal crossed the Ebro in 218 B.C. to sack the city of Saguntum. Carthage, of course, refused to give Hannibal over to the enraged Romans, and the states went to war. It is this historical point that our scenario models.

Hannibal was faced with the decision of whether to invade the Italic peninsula and if so, in what manner. Roman sea power made invasion by sea infeasible. However Hannibal knew that the Roman allies, which were Rome's best source of men and resources, were often coerced into this position, and so might view Carthage as a liberator, and be won over to Hannibal's cause.

This historical story provides some context and background for an interactive scenario. Agents in the Neverwinter Nights world can provide bits and pieces of such a history in conversation. However, these historical conditions are amenable to critical or strategic analysis. Different political or military advisors could provide different interpretations of these events, framing participants in domains of gain or loss almost arbitrarily. Perhaps if Carthage's trading empire had been more emphasized to Hannibal as a gainful and secure enterprise, he would have been less inclined to pursue the risky route of invasion.

The recounting of both background content and analytical content by agents in the Neverwinter Nights engine may be achieved with hypertextual dialogs. Furthermore, these dialogs are related in key ways – for example, new conversation options will appear for one agent after having had a certain conversation with another agent, or performing some other task describable in the NWScript language. In this way, the vuser experiences a rising action of scenario development as background knowledge opens the way to a decision-framing analysis.

The framing of the decision problem is thus achieved through multi-agent interactions, yet limited by the decisions of the designers..

## CONCLUSION

Just as video games gave much inspiration for interactive three-dimensional simulations, such simulations inspire new narrative forms and genres. Our work employs a three-dimensional interactive environment for and educational and experimental purposes.

We intend the interface to communicate narratives about historical circumstances, yet to also allow freedom of interaction and pacing of action. Progress of plot is achieved through minimal prompting from the agents populating the simulation and through pullulative moments of decision that the user controls. This immersive environment permits the testing of decision-making theories, and permits users to learn about historical events from a "first person" perspective.

## REFERENCES


1. Baudrillard, J. The Ecstasy of Communication, in Hal Foster, The Anti-Aesthetic: Essays on Postmodern Culture. New York: New Press, 1983.
2. Borges, Jorge Luis. Collected Fictions: Ficciones. Viking, 1999

3. Campbell, J. The Hero with a Thousand Faces. Princeton University Press, 1972.
4. Eco, Umberto. The Open Work. Harvard University Press, 1989.
5. Jung, C. G. Man and His Symbols. New York: Bantam Doubleday Dell Publishing, 1968.
6. Levy, Jack, "An introduction to prospect theory", Political Psychology, 13:2 (1992), pp. 171-186
7. Mikeal, Adam. Prospect Theory and the Punic Wars. http://adammikeal.org/courses/cnm/files/Prospect%20Theory.pdf
8. Mintz, Alex and Steven Redd, "Framing effects in international relations", Synthese, 135:2 (2003), pp. 193-213.
9. Murray, J. Hamlet on the Holodeck. Cambridge: MIT Press, 2002.
10. Polybius. The Rise of the Roman Empire, trans. Ian Scott-Kilvert. London: Penguin Books, 1979.
11. Simon, H. The Sciences of the Artificial. Cambridge: MIT Press, 1998.
12. Smuts, J. C. "Holism," *Encyclopedia Britannica*, 14th ed, vol 11, 1929.
13. Tversky, Amos and D. Kahnemen, "The framing of decisions and the psychology of choice", Science, 211 (1981), pp. 453-458
14. Wardrip-Fruin, N. and Harrigan, P., eds. First Person: New Media as Story, Performance and Game. Cambridge: MIT Press, 2004.