

# Information and Decision-making in Immersive Digital Environments

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# The Concept

- ▶ Crucial to the forward movement of narrative is *information exchange* among the actors
- ▶ In traditional media this happens in character dialog
- ▶ In new media, exchange can take place between any combination of **actors** and **agents**

# The Catalyst

- ▶ For an undergraduate research project, Adam used Dr. Alex Mintz's Decision Board program to test decision-making theories (i.e. expected utility, prospect theory, etc)
- ▶ Rather than contrived situations, actual historic events were used as the basis of the scenarios
- ▶ What if the simulation used an immersive, graphical environment? What would change?

# The Goal

- ▶ Create an immersive, interactive environment in which one could freely travel, using character interaction to gather information about the situation and necessary decision
- ▶ Can the resultant environment could be used to test the predictive abilities of various decision-making theories?
- ▶ Differences between controlled scenarios on each system might shed light on a digital environment's effects on the degree of identification and immersion in a scenario (story)

# Multi-disciplinary aspects

- ▶ Prospect theory
- ▶ Decision Board platform
- ▶ Hypertext theory
- ▶ Interactive narrative and New media
- ▶ History education

# Prospect Theory

- ▶ Prospect Theory attempts to explain certain failures of expected utility in the realm of decisions under risk
- ▶ The **framing effect** says that the decision-maker's perception of existing in a domain of gain or loss affects their view of the situation surrounding a choice
- ▶ Domain of Gain     ⇒ risk averse  
Domain of Loss     ⇒ risk acceptant

Levy, Jack, "An introduction to prospect theory", *Political Psychology*, 13:2 (1992), pp. 171-186

Tversky, Amos and D. Kahnemen, "The framing of decisions and the psychology of choice", *Science*, 211 (1981), pp. 453-458

Mintz, Alex and Steven Redd, "Framing effects in international relations", *Synthese*, 135:2 (2003), pp. 193-213

# Prospect Theory

- ▶ The **ratchet effect** describes how individuals re-adjust their expectations after net gains
- ▶ The **endowment effect** says that individuals value what they have more than comparable things they don't have; thus we weight small losses greater than large gains
- ▶ The **certainty effect** means that certain outcomes are overvalued with respect to probable outcomes
- ▶ Common criticisms:
  - ▶ Results can be explained by expected utility
  - ▶ Framing effects are not well-understood

# The Decision Board software

- ▶ Web-based application used to run decision-making simulations for research projects
- ▶ Users are briefed on a scenario, and presented with a matrix of available choices across various dimensions; their access patterns and final decision are recorded for later analysis
- ▶ Current version: Decision Board 4.0, <http://www.decisionboard.org/academic>

Mintz, Alex, Nehemia Geva, Steven B. Redd, and Amy Carnes. 1997. "The Effect of Dynamic and Static Choice Sets on Political Decision Making: An Analysis Using the Decision Board Platform." *American Political Science Review* 91 (September).

Mintz, Alex, and Nehemia Geva. 1997. "The Poliheuristic Theory of Foreign Policy Decisionmaking." In *Decisionmaking on War and Peace: The Cognitive-Rational Debate*, ed. Nehemia Geva and Alex Mintz. Boulder, CO

# Hypertextual issues

- ▶ Branching dialog can be represented as a hypertext; a directed graph of multiple nodes
- ▶ Noticed a variety of forms: some linear, some cyclical, tangles, loops, etc
- ▶ Hypertextual forms over two levels: conversations and the environment as a whole (hyper-media)

# History Education

- ▶ Prior work: the *Revolution* project by The Education Arcade  
<http://educationarcade.org/revolution>
- ▶ We emphasized decision-making theory over history education



# The Goal

- ▶ Create an immersive, interactive environment in which one could freely travel, using character interaction to gather information about the situation and necessary decision
- ▶ Test the predictive abilities of decision-making theories
- ▶ How does a digital environment affect the degree of identification and immersion in the story?

# Implementing the Goal

- ▶ Chose as our historical scenario the period between the 1st and 2nd Punic Wars between Rome and Carthage
- ▶ The setting was a generic Carthaginian city in colonial Spain.
- ▶ Decided on *Neverwinter Nights* world creation engine, selected for ease of editing capabilities, and strong control over branching dialog
- ▶ Scripting language used in this application is NWScript (C++)

# Implementation

	<b>Dimensional-based</b>	<b>Alternative-based</b>
<b>Domain of Gain</b>	1	2
<b>Domain of Loss</b>	3	4

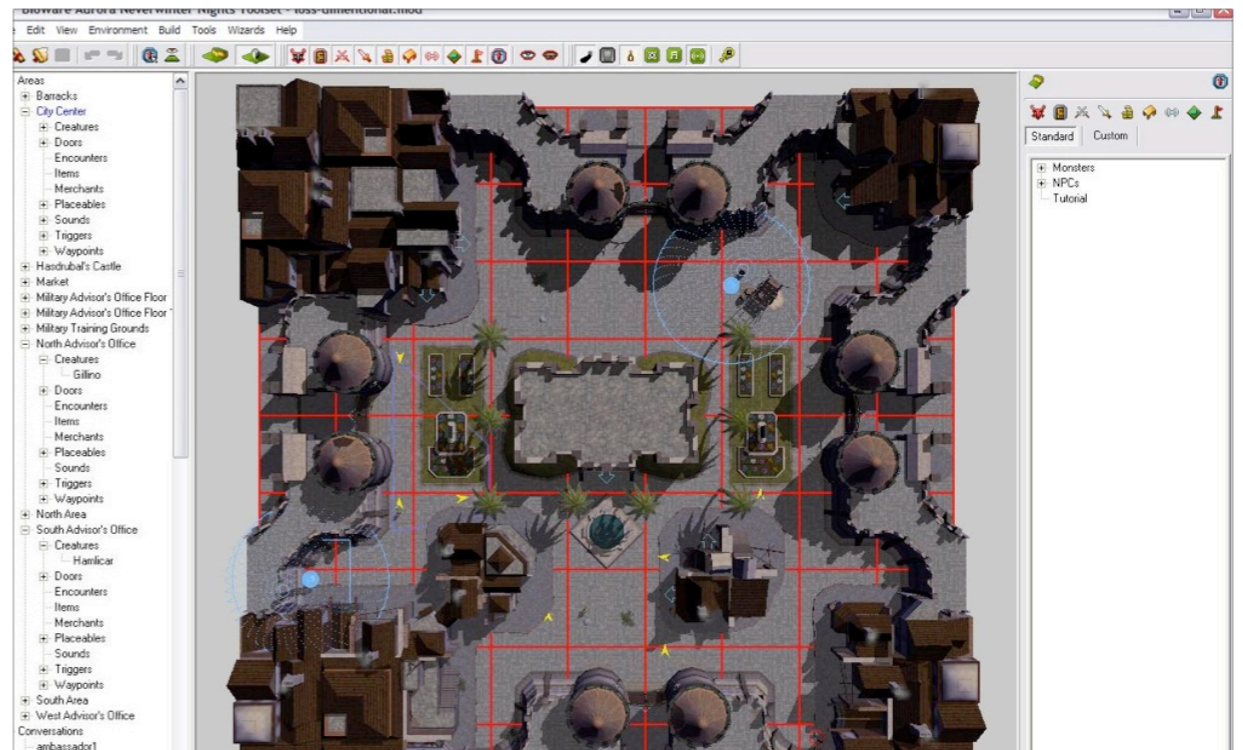
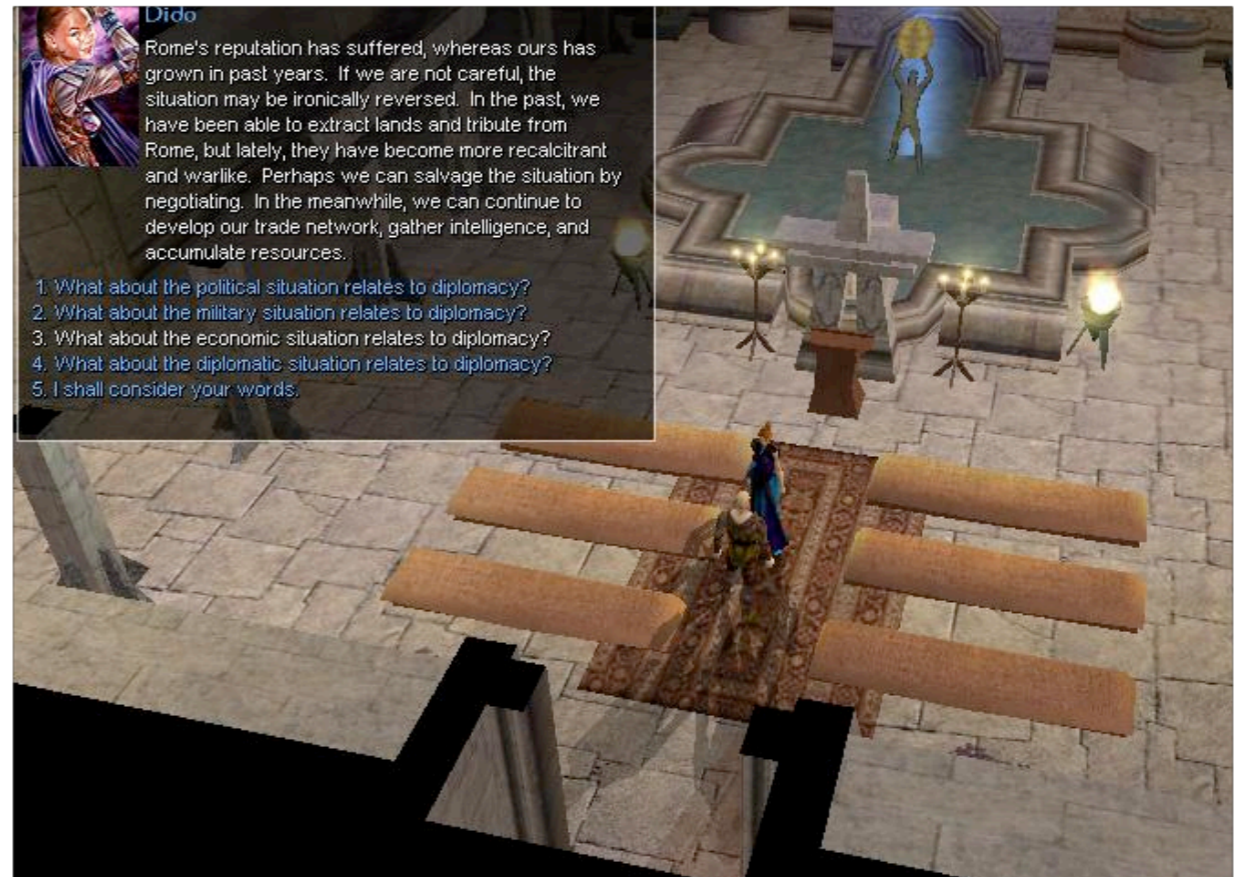


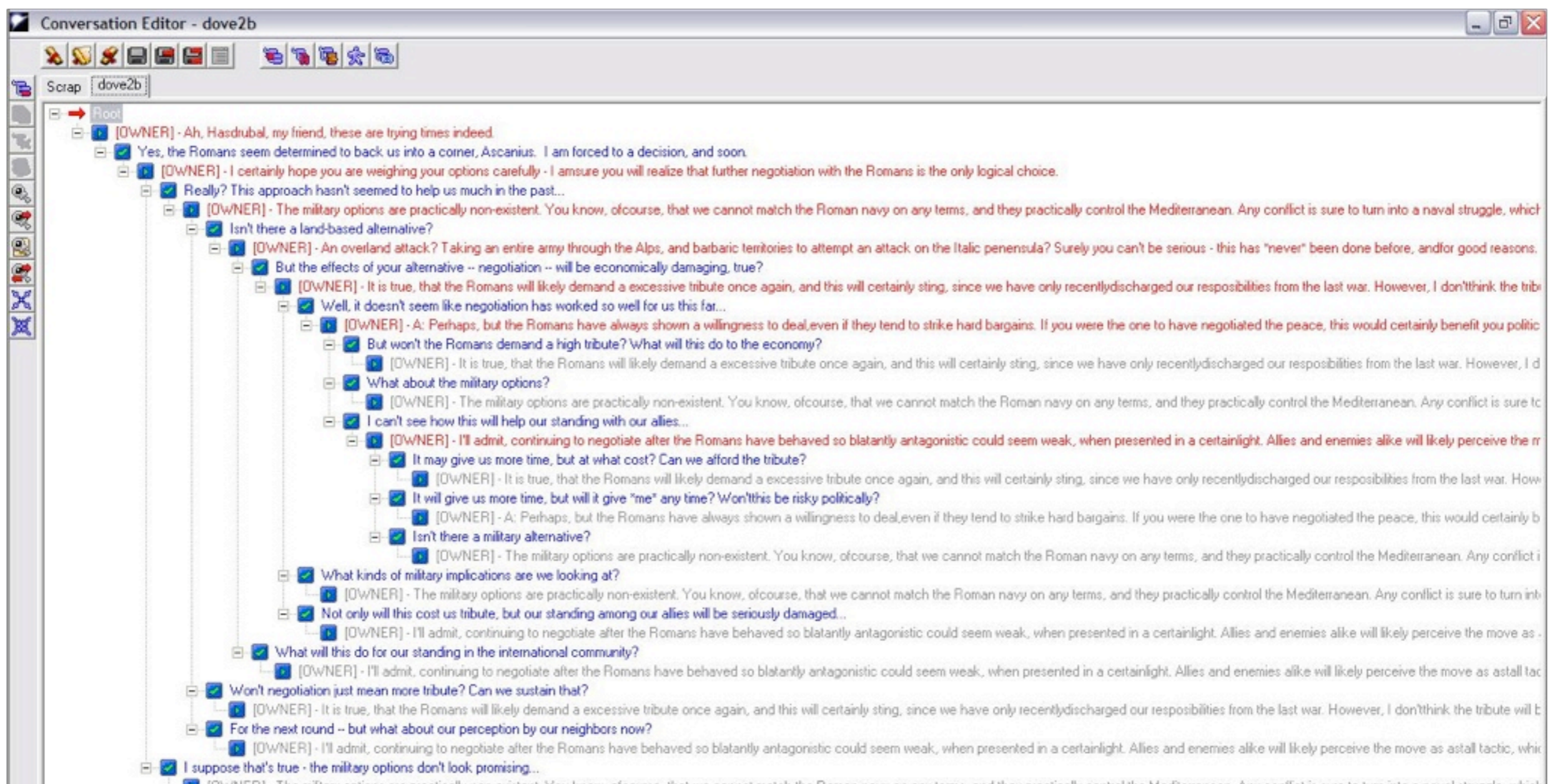
# Screen shot of environment

Neverwinter Nights environment creation engine used to create a fictional city with areas for each advisor, and numerous NPCs to engage the player

# Screens

Conversation and world editor





# Conversation editor

Hypertextual structure of dialogs is evident in the editor screens

# Development Issues

- ▶ Historical accuracy of the scenario vs. creating the framing effect
- ▶ Immersion in the environment vs. user frustration
- ▶ Differences in the perception of information in different media (text chunks vs. interactive dialogs) - *fundamental attribution error*
- ▶ Tools for creating the framing: text only vs. multi-media

# Project Demo

