Chapter 1

The Cooperative Contract in Interactive Entertainment

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Abstract: Interactions with computer games demonstrate many of the same social and communicative conventions that are seen in conversations between people. I propose that a co-operative contract exists between computer game players and game systems (or their designers) that licenses both the game players' and the game designers' understanding of what components of the game *mean*.

As computer and console games become more story-oriented and interactivity within these games becomes more sophisticated, this co-operative contract will become even more central to the enjoyment of a game experience. This chapter describes the nature of the co-operative contract and one way that we are designing game systems to leverage the contract to create more compelling experiences.

Key words: computer games, interactive narrative, discourse

1. INTRODUCTION

When people speak with one another, they *co-operate*. Even when we argue, we are collaborating together to exchange meaning. In fact, we agree on a wide range of communicative conventions; without these conventions, it would be impossible to understand what each of us means when we say something. This is because much of what we mean to communicate is conveyed not by the explicit propositional content of our utterances, but by the implicit, intentional way that we rely or fail to reply upon conventions of language use when we compose our communication.

Across many media, genres and communicative contexts, the expectation of co-operation acts much like a contract between the participants in a communicative endeavor. By establishing mutual expectations about how we'll be using the medium of our conversation, the contract allows us to eliminate much of the overhead that communication otherwise would require. Our claim is that this compact between communicative participants binds us just as strongly when we interact with computer games as when we interact with each other in more conventional conversational settings. Further, by building systems that are sensitive to the nature of this co-operative contract, it's the goal of our research to enable the creation of interactive narratives that are more engaging as well as more compelling than current state-of-the-art interactive entertainment.

2. COOPERATIVE DISCOURSE ACROSS GENRE AND ACROSS MEDIA

H. P. Grice, the philosopher of language, characterized conversation as a co-operative process [Grice 1975] and described a number of general rules, called the *maxims of conversation*, that a co-operative speaker follows. According to Grice, speakers select what they say in obedience to these rules, and hearers draw inferences about the speaker's meaning based on the assumption that these rules guide speakers' communication.

Grice's Co-operative Principle states

> Make your conversational contribution such as is required, at the stage at which it occurs, by the accepted purpose or direction of the talk exchange in which you are engaged.

From this very general principle follow four maxims of conversation:

- The Maxim of Quantity: Make your contribution as informative as required but no more so.
- The Maxim of Quality: Try to make your contribution on that is true.
- The Maxim of Relation: Be relevant.
- The Maxim of Manner: Be perspicuous.
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The Co-operative Principle and its maxims license a wide range of inferences in conversation that are not explicitly warranted by the things that we say. Consider the following exchange:

Bob: How many kids do you have?

Frank: I've got two boys.

In this exchange, Bob relies upon the Maxim of Quantity to infer that Frank has only two children, even though Frank did not say that he had two *and only two boys and, furthermore, no girls*. For Frank to respond as he does should he have two boys and two girls at home would be *uncooperative* in a Gricean sense precisely because it violates our notions of what can be inferred from what is left unsaid.

This is just one example of how meaning can be conveyed without being explicitly stated, simply based on an assumption of co-operativity. This reliance upon co-operation is also observable in contexts other than person-to-person communication. For instance, the comprehension of narrative prose fiction relies heavily on inferences made by a reader about the author's intent. Consider the following passage, suggested by the experiments in [Gerrig 1993]. Our hero, James Bond, has been captured by the criminal genius Blofeld and taken at gunpoint to his hideout.

> James' hands were quickly tied behind his back, but not before he deftly slid a rather plain-looking black plastic men's comb into the back pocket of his jump suit. Blofeld's man gave him a shove down the hallway towards the source of the ominous noises that he'd heard earlier.

In the passage above, the author makes an explicit reference to the comb in James' pocket. As readers, we assume that this information will be central to some future plot element (e.g., the comb will turn out to be a laser or a lock pick or a cell phone) – why else would the author have included it? So we set to work at once anticipating the many ways that James might use the "comb" to escape from what seems a serious predicament. When the comb later turns out to be as central as we suspected, we're pleased that we figured it out, but the inference that we made was licensed only by our assumption that the author was adhering to the Maxim of Relevance. In fact, Relevance comes to play so often in narrative, that its intentional violation by an author has a name of its own: the *red herring*.

This type of co-operative agreement exists in other, less conventional communicative contexts as well. Film, for instance, also relies on the same communicative principles [Branigan 1992]. As one example, when the location of action in a film changes from Place A to Place B, filmmakers often insert an external shot of Place B after the action at Place A ends. Called an *establishing shot*, this inserted footage

acts as a marker for the viewer, helping her to understand the re-location of the action without breaking the narrative flow by making the transition explicit.

3. A COOPERATIVE CONTRACT FOR INTERACTIVE STORIES

For the designer of a narrative-oriented game that allows substantive user interaction, the greatest design challenge revolves around the maintenance of the co-operative contract, achieved by the effective distribution of control between the system and its users. If a game design removes all control from the user, the resulting system is reduced to conventional narrative forms such as literature or film. As we've discussed above, well-established conventions in these media provide clear signals to their audience, but provide for no interaction with the story. Alternatively, if a game design provides the user with complete control, the narrative coherence of a user's interaction is limited by her own knowledge and abilities, increasing the likelihood that the user's own actions in the game world will, despite her best efforts, fail to mesh with the storyline.

Most interactive games have taken a middle ground, specifying at design-time sets of actions from which the user can choose at a fixed set of points through a game's story. The resulting collection of narrative paths is structured so that each path provides the user with an interesting narrative experience and ensures that the user's expectations regarding narrative content are met. This approach, of course, limits the number and type of stories that can be told.

In our work in the Liquid Narrative research group at North Carolina State University, our approach is to provide a mechanism by which the narrative structure of a game is generated at execution time rather than at design time, customized to user preferences and other contextual factors. The programs that we use to create storylines build models of the story plots that contain a rich causal structure -- all causal relationships between actions in the story are specifically marked by special annotations. We put the annotations to good use during gameplay every time that a user attempts to performs an action. As a user attempts to change the state of the world (e.g., by opening a door, picking up or dropping an artifact), a detailed internal model of that action is checked against the causal annotations present in the story. As I describe in more detail below, if the successful completion of the user's action poses a threat to any of the story structure, the system responds

to ensure that the actions of the user are integrated as best as possible into the story context.

It is the interactive nature of a computer game that contributes most strongly to the unique sense of agency that gamers experience in the narratives that the game environment supports. But the role of the gamer in a typical computer game is not one of director, but rather of lead character. She does not enter the game world omniscient and omnipotent, but experiences the story that unfolds around her character through the eyes of an audience member, the eyes of a performer and through the eyes of her character itself. To uphold her portion of the co-operative contract, she must act well her part, given her limited perceptions and capability to change the game environment.

Consequently, the system creating the storyline behind the scenes must bear most of the responsibility for maintaining the work product of the collaboration, i.e., a coherent narrative experience. To do this, it must plan out ahead of time an interesting path through the space of plot lines that might unfold within the game's storyworld. In addition, the game itself must keep constant watch over the story currently unfolding, lest the user, either by ignorance, accident or maliciousness, deviate from the charted course.

Fortunately, all aspects of a user's activity with the game system, from the graphical rendering of the world to the execution of the simplest of user actions, are controlled (well at least, they're *controllable*). It is the mediated nature of the interaction between player and game environment that provides us with the hook needed to make the game system co-operative in a Gricean sense. That is, to provide the user with a sense of agency while still directing the flow of a story around the user's (possibly unpredicted) actions.

To support this mediation we are developing a system that sits behind the scenes of a computer game engine, directing the unfolding action while monitoring and reacting to all user activity. The system, called *Mimesis* [Young 2001], uses the following components:

a) A declarative representation for action within the environment. This may appear in the type of annotations to virtual worlds suggested by Doyle and Hayes-Roth [1998], specifically targeted at the representational level required to piece together plot using plan-based techniques described in (b).

b) A program that can use this representation to create, modify and maintain a *narrative plan*, a description of a narrative-structured action sequence that defines all the activity within the game. The narrative plan represents the activities of users, system-controlled

agents and the environment itself. This program consists of two parts: an AI planning algorithm such as *Longbow* [Young, Pollack and Moore 1994] and an execution-monitoring component. The planning algorithm forms plans for user and system interaction that contain such interesting and compelling narrative structure as rising action, balanced conflict between protagonist and antagonist, suspense and foreshadowing. The execution monitor detects user activities that deviate from the planned narrative and decides how to respond. The response might take the form of re-planning the narrative by modifying the as-yet-unexperienced portions of the narrative plan, or it might take the form of system intervention in the virtual world by preventing the user's deviation from the current plan structure.

c) A theory capable of characterizing plans based on their narrative aspects. This theory informs the program in (b) above, guiding the construction of plans whose local and global structure are mapped into the narrative structures of conflict, suspense, etc.

4. CONCLUSIONS

People interact with systems such as computer games by using many of the same social and communicative conventions that are seen in interactions between people [Reeves and Nass, 1996]. I propose that expectations about collaboration between computer game players and game systems (or their designers) that licenses both the game players' and the game designers' understanding of what components of the game *mean*. Consequently, the co-operative nature of the gaming experience sets expectations for the behavior of both the game and its players. As computer and console games become more story-oriented and interactivity within these games becomes more sophisticated, this co-operative contract between game and user will become even more central to the enjoyment of a game experience.

The basic building blocks of story and plot --- autonomous characters, actions and their causal relationships --- are not new to researchers in Artificial Intelligence (AI). These notions are the stuff that makes up most representational schemes in research that deals with reasoning about the physical world. Much of this work has been adapted in the Mimesis architecture to represent the hierarchical and causal nature of narratives identified by narrative theorists [Bal 1997, Rimmon-Kenan 1983]. The idea that Grice's Co-operative Principle might be put to use to characterize interactions between people and computers is also not new

[Young 1999]. But the question of balance between narrative coherent and user control remains an open one, and will not likely be answered by research into human-computer interaction or by modification of conventions carried from over previous entertainment media. It seems more likely that the balance between interactivity and immersion will be established by the concurrent evolution (or by the co-evolution) of the technology of storytelling and social expectations held by the systems' users.

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