AI-based Design and *The Prom*

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ABSTRACT
In this paper, we present *The Prom*, a social simulation game about the interpersonal lives of a group of high school students in the week leading up to their prom, and the lessons learned from its AI-based design. By starting the design of the game with a theory of social interaction, *The Prom* is able to present satisfying stories that reflect the player's choices in a wide possibility space – two features that rarely accompany one another. Using an AI-based approach has resulted in many lessons and observations both about the issues themselves and the process of AI-based design. This paper reports these observations, the game's design evolution, and the design details of how *The Prom* attempts to achieve rich character specificity while maintaining a highly dynamic story space.

Categories and Subject Descriptors
K.8.0 [Personal Computing]: General – Games. I.2.4 [Artificial Intelligence]: Knowledge Representation Formalism and Methods – Representations (procedural and rule-based).

General Terms
Design

Keywords
Game design, social simulation

1. INTRODUCTION
Contemporary videogames boast highly developed characters in intricately woven plots, though often achieve their richness at the expense of emergence and the player's ability to make meaningful choices that affect the game's narrative. For example, *Mass Effect* [1], a game known for its storytelling, limits social interactions with crewmates to between-mission segments, effectively eliminating the potential (found in many other storytelling forms) of interpersonal elements of the plot developing in concert, and intertwined with, the rest of the action. Moreover, the plot to *Mass Effect* is largely static, with only a handful of story decisions having an impact on the narrative. This style has previously been described as the "beads on a string" approach to interactive storytelling [5].

Conversely, games such as *The Sims 3* [2] give players significant control over the development of the social space between the characters, but the characters themselves are largely empty vessels who speak in abstract thoughts through which the player enacts their will. Clearly, both *Mass Effect* and *The Sims 3* have met with tremendous commercial success and are exemplary games that many people, the authors included, admire greatly. That said, there are currently very few games that permit the dynamism of *The Sims*'s social space with the finely crafted characters and story of *Mass Effect*.

There are several reasons why there aren't more examples of the intersection of these two experiences. One is authorial burden; hand-writing a rich story amenable to player interaction is extremely difficult, and can quickly lead to an exponential increase in states. A common way to encode these alternative states is through accounting for branch points off the main path of the narrative. As more branches are crafted, however, it becomes more and more difficult to author coherent storylines that accurately reference, and lend importance to, all of the player's choices that came before. This experience is also restrictive for the player, as it reduces their means of influence to pre-determined choice points, rather than giving them the power to significantly affect the narrative at any moment. Another reason that more examples do not exist of rich characters in a dynamic story spaces is simply that so few fully realized works even strive for these qualities and thus there exist only a handful of games that could inspire others to want to explore this field.

In this paper, we present *The Prom*, a social simulation game about the dramatic week leading up to a high school prom. Players of *The Prom* indirectly sculpt the social landscape by having characters engage in social exchanges with each other. The results of these social exchanges are many and varied—ranging from mild changes in sentiment toward each other to characters professing their eternal love—and are informed by over 3500 sociocultural considerations managed by the artificial intelligence system *Comme il Faut* (*CiF*) [12]. Through shifting the interpersonal relationships and learning the personal intricacies of the characters, the player can solve a series of "social puzzles"; such as making the class nerd the prom king, or bringing peace between feuding jocks and preppies.

CiF has enabled a new genre of videogame experience that the authors have termed the *social physics puzzle*. Just as existing traditional physics puzzles rely on the player's intuitive understandings of gravity, force, etc., the social puzzle leverages the player's inherent knowledge of how people behave in a variety of social situations. In the delicate system of *social physics*, the smallest social change reverberates and impacts the entire system leading to emergent solutions and surprising, yet satisfying, outcomes.

Figure 1. *The Prom's* user interface that shows Naomi and Cassie's social state and what social exchanges Naomi wants to do with Cassie

Designing *The Prom* has been an experiment in the—we believe under-explored—domain of AI-based design [6]. AI-based design involves creating new artificial intelligence techniques to tackle difficult game design problems and can lead to the discovery of innovative and new genres of games. Using this approach has resulted in many lessons and observations both about the issues themselves and the process of AI-based design. This paper reports these observations, the game's design evolution, as well as the design details of how *The Prom* attempts to achieve rich character specificity while maintaining a highly dynamic story space.

We hope that, in addition to being an example of a new form of gameplay, *The Prom* serves as an inspiration to others to further carve out new spaces in game design using AI-based design.

2. *COMME IL FAUT* AND GAMEPLAY

Gameplay in *The Prom* involves solving level goals—such as making the class nerd, Zack, date a popular girl--within a limited number of turns by directing the characters to engage in social games. Social games are "multi-character social interactions whose function is to modify the social state existing within and across the participant" [11]. Which social games are available and how each changes the social state is managed by the game's AI system, *Comme il Faut* (*CiF*) [12]. The player chooses among the top social games that the character desires to play with each character. Enabled by the social physics of *CiF*, each level's goal has innumerable solutions that all maintain character believability. For example, the player could have Zack bond with a popular character over a shared interest to build a relationship grounded on friendship, or he could exploit a popular character's trait of "competitive" and have Zack flirt with someone who the popular character is jealous of.

What exchanges each character wants to do with each other character is determined by his or her social context. Additionally, how each character responds the exchange is also determined in this way. Figure 2 shows an excerpt from a social exchange where Zack asks Monica on a date and Monica rejects him because he isn't popular. As elaborated below, while Zack not being popular

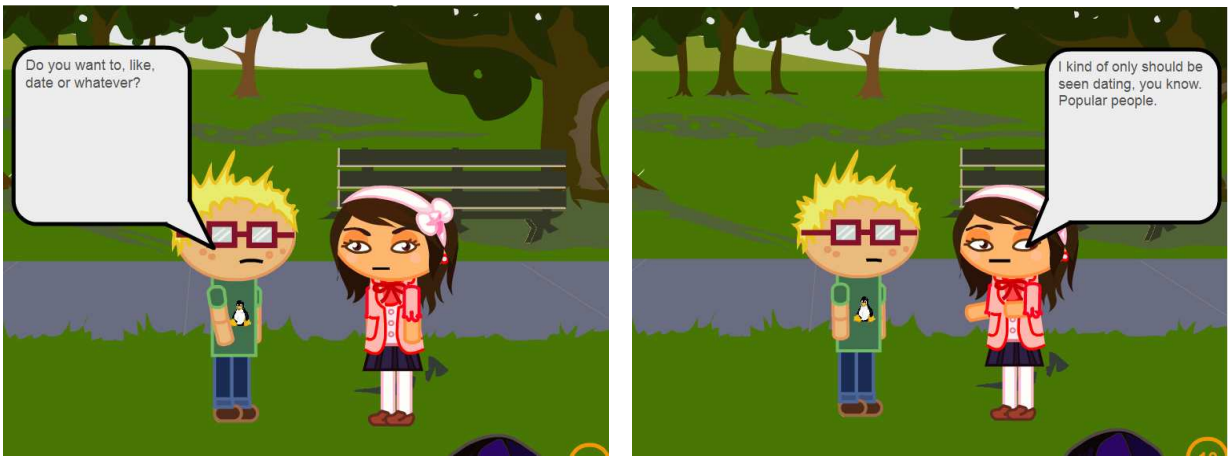

Figure 2. An excerpt from a social exchange where Zack tries to ask out someone out who is out of his league. Her rejection reflects her cold and honest personality.

was likely a significant consideration in Monica's choice, there were many additional reasons.

While goals usually pertain to specific characters, players take on the role of an external observer and manipulator who can select which social actions all characters take. For example, to remedy the situation in figure 2, the player can try to make Zack popular, by getting him more friends, performing *cool* actions, etc. Or the player can make it so Monica is no longer popular, by having her do *embarrassing* things, break up with friends, etc.

Because the gameplay of *The Prom* involves manipulating the social space, the focus of most popular narratives, the *gameplay is the story*. And this story is authored in the sense that the designers create the initial situation, define the goals for each scenario, craft the interactions available, and so on. And yet because *CiF* enables emergent solutions to each social puzzle, the resulting story space is highly dynamic and responsive to player actions.

2.1 Social Physics

Video games have achieved a high level of playability in physical spaces; combat, movement, and physics-based puzzles are all very playable and well modeled. *The Prom* set out to make social spaces as playable as physical spaces currently are. The goal was not to recreate the everyday social world, but to create social dynamics specifically crafted for a targeted experience — just as platforming games don't reproduce the physics of the everyday world (but rather tune physics for gameplay) and fiction writers portray behavior and dialogue in stylized fashions that differ markedly from the average conversation.

Without a system like *CiF*, representing social interactions, cultural context, and the consequential interactions between the two in their entirety is impractical, or perhaps impossible. This task of representation would be similar to that of representing the possible combinations of player interactions and their impacts in the virtual world. The space of contexts (states of the virtual world) and social interactions (player interactions) is prohibitively large — and not necessarily the ideal one for authorial expression. *CiF* provides knowledge representation and processes that model social interactions that make this ambitious goal tractable to implement.

The Prom's social physics is comprised of over 3,500 sociocultural considerations. The considerations are the rules that influence the character's desires and have either a positive or negative numerical weight to each social game. The player chooses among the top desires of the characters. For example, a character with the trait of vengeful will be more likely to do something mean to someone who has just done something mean to them. These rules encode a notion of "social common sense" which is what the player will reason over while striving to satisfy each level's goal. In this way, we refer to each level as a "social puzzle."

2.2 Social State

The following will provide a high level description of the components of *The Prom*'s social state which were arrived at after several design iterations (described below):

Relationships: binary, reciprocal and public connections between characters. The three relationships in *The Prom* are: friends, dating and enemies.

Social Networks: scalar, non-reciprocal and private feelings from one character toward another. The three networks are: Buddy, Romance and Cool.

Statuses: binary, temporary feelings that often result from multiple interactions. Some statuses, such as embarrassed, are internal private feelings. Other statuses are public and represent social standing, for example, being popular.

Traits: permanent attributes of a character's personality. Most traits are private, such as being "competitive," while others are public knowledge, such as being a "sex magnet."

Social Fact Database: the social history of interactions between characters. All entries in the social fact database are public knowledge and thus comprise the characters' collective social history.

Cultural Knowledge Base: the objects of the social world, each character's relationship and the "zeitgeist" or popular opinion about that object. For example, Zack may "like" the object "scientific calculator" which is commonly understood to be a "lame" object.

The following example illustrates the structures described above, and will be used again to demonstrate the processes.

Simon is a character with the traits of being a weakling and witty. Naomi is a character with the trait of attractive. Simon has the status of having a crush on Naomi, and Naomi has the status of popular. Naomi and Simon have the relationship of being friends. Simon has high romance network values toward Naomi and she has very low romance scores towards him. Naomi also has low cool network values toward Simon. All other network values are neutral. The cultural knowledge base states that Simon likes objects labeled as "lame," such as scientific calculators, and Naomi likes things that are "cool," such as footballs. In the social fact database is an entry marked as something embarrassing that Simon had done towards Naomi in the past. It is described as "Simon misunderstood Naomi asking for help on homework as a romantic advance."

This is just a single example of how the components of *CiF* detailed above work together to create recognizable social situations which, as will soon be shown, are rich with the potential for drama.

2.3 *CiF*'s Processes

In the initial work toward creating a playable social model, we leveraged Goffman's dramaturgical analysis [7] to encode patterns of normal social behavior in the previously-mentioned social games. Growing from their definition coined during the development of *Façade* [9], social games have been defined as multi-character social interactions whose function is to modify the social state existing within and across the participants. Social games are designed to encode normal patterns of social behavior while providing space for personality-specific character behavior in a format that an AI system can make use of. Essentially, *CiF* is a system that determines what social games characters desire to play and how they respond when others play games with them.

All of the character's desires and responses to interactions are determined by influence rules comprised of aspects of the state encoded into *CiF*. As a simple example, if a character is friends with someone, he will be more likely to want to do something nice to that person. As a more complex example, imagine that a character (x) is friends with someone (y) who is friends with

someone else (z) that x isn't friends with, and y has been interacting with z recently and not with x. Fearful of losing their friend to a stranger, x would be a little more likely to want to do something to get y's attention.

CiF operates by looping through a set of processes. The first process is desire formation. This process determines a character's volition (or will) to play a social game with other characters. Every time desire formation is executed, every character determines their volition to play every social game with every other character. Volition is scored by counting the weight of the true influence rules. After this process, all characters in the cast have a volition value for every social game with regards to every other character.

Next, a social game is selected to play (by the player). Social games have an initiator intent (the initiating character's desired social change) and three roles: an initiator, a responder, and a possible third party or other. When a social game is chosen to be played, the initiator is the character for which the volition was scored. The responder is whoever the game was scored to be played with. If a third party is involved in the game, *CiF* selects the character for whom the most influence rules pertaining to a third party were true.

With a game chosen, the social game play process commences and has two main responsibilities. The first is to determine how the responder reacts to the game. This process is very similar to scoring volition in the intent formation process: the sum of true rules that pertain to responding to the social game. If the sum is zero or greater, the game responder accepts the intent of the game. Otherwise it is rejected.

Each social game has several ways it can play out that depend on the social state and whether the game was accepted or rejected. These are called social game *effects*. For example, if a character plays a game called "Share Interest" with another character, and the game is accepted, there could be an effect specific to situations in which the two characters both like a "cool" object in the cultural knowledge base and another in which they bond over a "lame" object, celebrating their deviation from the will of the zeitgeist.

CiF's processing loop ends with performance realization along with the side effects of social game play. Each effect is associated with a performance realization instantiation. An instantiation is a set of template-based dialogue acts and associated animations. After the instantiation is realized, the social state change associated with the chosen effect is applied. This includes placing an entry into the social facts database to account for the played game, to be referenced and considered in all future social exchanges.

The last step is running a set of "trigger rules" over the new social state. Trigger rules account for social changes that result from multiple social games and other elements of the social state. For example, a character will receive the status of "cheating" after starting a relationship with one character when they are already dating someone else.

2.4 Levels, Story Progression and Endings

Designing *The Prom* around *CiF* has resulted in unique opportunities for innovation in story and difficulty progression design. The game's puzzle-based nature could easily have conflicted with our desire to tell coherent and satisfying stories. The structure of the levels and goals were designed to address these potential conflicts.

A player of *The Prom* begins by selecting a *Story* to play. A Story is a collection of levels, with each level's goal corresponding to a plot point in the overall story arch. In addition to a goal, each level consists of a set of characters that are present and a distinct setting, such as the park or the school quad.. For example, the Story titled *Prom King* is a series of levels whose goals, if successful, portray the rags to riches tale of Zack, the class nerd, becoming the prom king. The first level tasks the player with ending Zack's war against two popular bullies in the hallway. A later level involves pulling strings until Zack is dating someone "cool" at the park. Note how the earlier goal of eliminating Zack's popular bullies will likely help the player with this new goal as the popular crowd will not be as disdainful toward Zack. The completed goals from earlier levels help the player complete later levels. As mentioned above, objectives can be met in a variety of ways; the player can forge a friendship between Zack and the bullies, or perhaps make the bullies lose their social standing, and in so doing lose the sway their antagonism for Zack would otherwise have.

Each level can potentially be failed by not completing its goal within a given number of turns. However, we didn't want to invalidate the story that the player had been building by making him or her have to replay the failed level from the beginning with its initial starting state. Because of this, we allow each player to choose whether he or she wants to erase the social state changes and replay a level from the beginning, or retain the current state and continue to the Story's next level. Though the levels were designed to build upon each other, because of the many emergent solutions to goals, not meeting an earlier objective does not necessarily mean that a player has no chance of completing a later level's objective.

Every Story's last level takes place at the prom. A Story concludes when the player selects one of the many endings that are unlocked according to the social state he or she has built throughout all of the Story's levels. For example, Prom King might end happily with Zack successfully becoming Prom King if all of the level objectives were satisfied. Conversely, if the player had Zack abandon his geeky best friend in an attempt to become popular, that former friend may attempt to humiliate Zack during Prom King's climax. Zack may not even become Prom King at all, but will finally muster the courage to express his feelings to the girl of his dreams (assuming, of course, that the social state contains a girl that fits the criteria). Special endings are also created to address where the player has failed to meet earlier level goals. In this way, *The Prom* tries to make all Stories have cohesion with the player's actions. Furthermore, as players become better at the game, they can strive to unlock all endings, create particularly awkward or humorous situations, recreate events from their own lives, attempt to solve each level's social puzzles in as few moves as possible, and otherwise explore the social world through play.

3. *THE PROM*'S AI-BASED DESIGN

The impetus for creating *The Prom* was to create a compelling game experience around the, then in-development, social AI system *CiF*. The entirety of *The Prom* was designed in the domain of this specific AI system. This motivation departed from the standard relationship of AI systems to games (often being tools to control NPC combat or smooth over parts of a game design) to being the foundation for the design. This methodology, called AI-

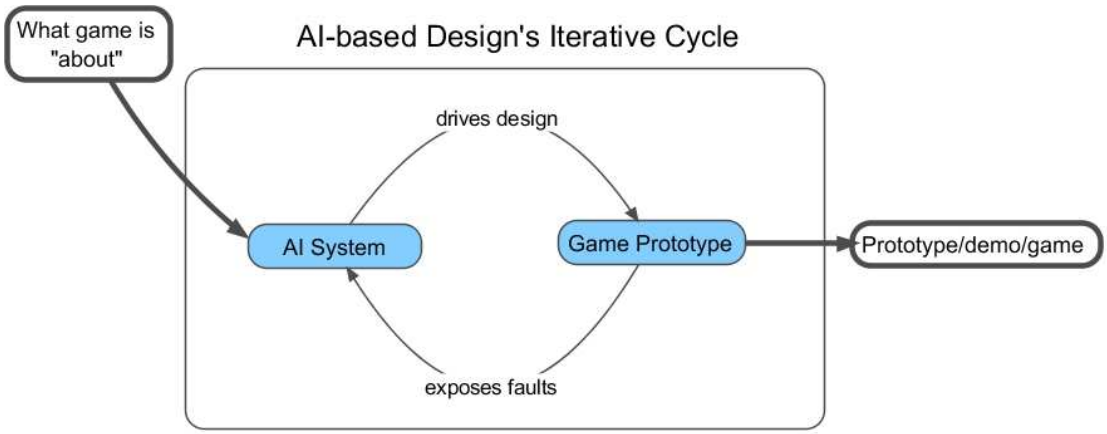

Figure 3. AI-based game design involves starting with an idea of what the designer wants the game to be about and after several design iterations on both the game and the AI system, the game emerges

based game design [6] or expressive AI [10], fundamentally changes the concerns of typical design; instead of thinking of design choices and game mechanics in terms of genre conventions or physics systems, the primary criteria lie in the domain of the AI system. In this case, *CiF* is the AI system around which the design is centered, so the changing social situations of virtual characters brought about through social game play are the primary concern.

As AI-based game design is distinctly different from other game design methodologies, it has the potential to create new types of video games. The space of all possible video game designs is large and only a tiny fraction of it has been explored. By employing this approach, the design process has the potential to lead to unexplored spaces of design. Shifting the scope and focus of the design process from current game design techniques to what can be captured algorithmically opens the path to these unexplored design spaces. This creates games that are intrinsically tied to a certain domain; they are *about* something in both theme and game play. As an example, *The Prom* leverages *CiF*'s ability to play social games and form the intents and desires of characters. This enables a game in a new design space, a social puzzle game. *The Prom* is *about* the social lives and interactions of its characters as nearly all of the game design considerations of the game are about social play between autonomous agents. This method of video game design opens a space potentially as expressive as the vast realm of what can be captured in AI systems.

Another benefit of AI-based game design is the way that the design of the game, authoring content for the game, and the AI system inform one another (figure 3). The act of designing game mechanics to be used in conjunction with an AI system tests the AI system. By exploring and determining the affordances the AI system provides (or fails to provide) for gameplay, the designer exposes the weaknesses and strengths of the AI system in modeling its domain which can be used to improve the AI system. After tweaking and enhancing the AI system to fit the previous notions of the game design, the AI system opens up new possibilities of game design in much the same way the game design just did for the AI system. This cycle of iterative refinement of the AI system and game design serves to improve the design and functionality of both systems: the AI system becomes better at modeling its domain while the game becomes both a better gameplay experience and better at providing play in its domain. This process of creating a fully-playable game based on an AI system is potentially very beneficial to developers of AI systems in areas such as story generation, natural language generation, and social or psychological modeling. The level of refinement of creating a full game experience over that of even system demos is great and could make already powerful systems even more potent.

The following sections are an overview of some of the milestones of *The Prom* and *CiF* during their development through the AI-based design process. The sections chronicle the phases of development from early prototypes, capability demos, and fully-playable version of *The Prom.*

3.1 Assisted Paper Prototype of *CiF* 1.0

This version of *CiF* was to represent and reason over compelling social situations along with the variations of the resultant behavior that arise from different personalities being placed in similar roles. *CiF* [11] was implemented as a paper prototype with a computational assistant (figure 4). The prototype had the player choose to side with one of the two high school factions (Goths or Emos) and have that faction win the favor of the nerd running the audio equipment (Milton) at the prom for control of the music

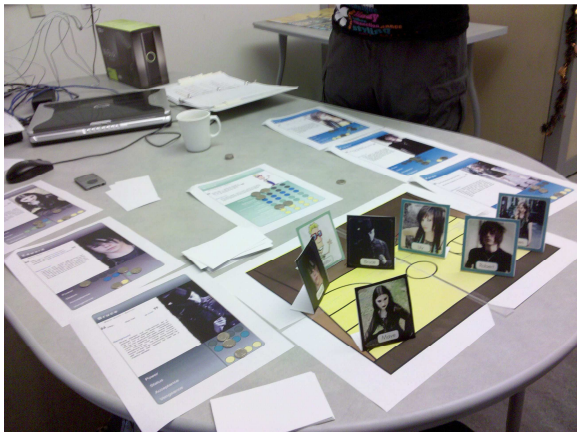

Figure 4. The computationally assisted paper prototype for *CiF*

playlist for the evening. Characters with personality descriptions taken from Reiss' motivational analysis [13] were present as stand-up models and character sheets. The player was dealt a hand of cards (each listed with basic needs effects) and was able to play them on the characters. After cards are played on characters, the game master would enter the cards' effects in the computational assistant, which would then determine which social games would be played by the characters. If the social game resulted in behavior in line with Milton's personality, a token would go to the faction of the character who initiated the social game. After 10 rounds of game play, the faction with the most tokens would gain Milton's favor and control of the playlist for the evening.

As this prototype was both the first incarnation of *CiF* and a game design around *CiF*, this iteration of design was malleable and resulted in sweeping changes to preconceptions of what a game in the space of social play would be. Through the development process and play testing, we discovered that social games solely driven by psychological needs were unintuitive and hard to communicate and justify to players. Particularly, the abstracted social games played by the characters did not match the games that were anticipated by the play testers given the characters' basic needs. Motivated by this, *CiF2* shifted its focus to the logic of social statuses and relationships between characters.

Realizing that creating an AI system that is to be used as the core of a video game requires a different frame of thinking than implementing a model "correctly" was an important step in our process. Our direct, simple, straight forward implementations of complex topics, such as our basic needs modeling from motivational analysis, did not capture the depth of social play we were hoping to capture; a few vectors of scalar values with a small amount of conditional logic did not provide a compelling game experience and proved to neglect the aspects of social state that players tended to reason over: the social context. Instead of exposing the engineering choices as game mechanics, we decided to base the affordances given to the player on what our players were thinking when they played the game.

3.2 *Promacolypse* Demo of *CiF* v2

The version of *Comme il Faut* presented at *Game Developers' Conference* 2010 [8], titled *Promacolypse* (figure 5), comprises the second milestone in this example of AI-based game design. The version of *CiF* used in the *Promacolypse* demo was a redesign focused much more on the social space around the entire cast of characters and not focused on individual characters and their psychological needs. We also abandoned the idea of antithetical ways to play social games stemming from Berne's transactional analysis [4]. These antithetical ways of playing social games flipped the intent of the social game on its head which resulted in unpredictable agent behavior and confused players. This demo was completely computational and consisted of many of the same processes and data structures described in the proceeding sections; social networks, statuses, CKB, SFDB, and triggers were all added to *CiF* to support the new design decisions as well as facilitate making the previously-paper parts of the game computational.

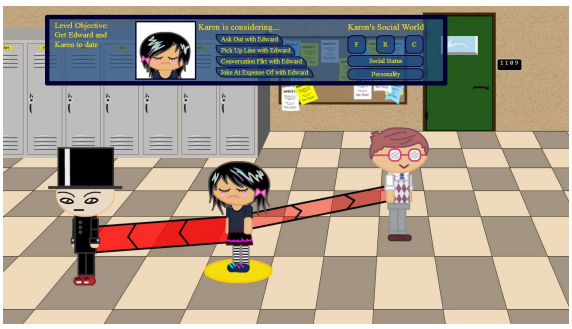

Figure 5. A screenshot of *Promacolypse* demo that demonstrated the early "social context" based version of *The Prom*

With such large changes made to the AI system, many new options of game design presented themselves. While the game was still character-based, the goal of the game became to reach certain social states through making the characters play social games with one another (as opposed to the previous paradigm of playing cards consistent with character's basic psychological needs). With the exclusion of antithetical social game outcomes, the responders to initiated social games needed a way to respond to the intent of the game; if the initiator started a flirtatious game with someone who has low romance with them, the responder would need a way to have their say in the outcome of the social game. To achieve this, antithetical social game outcomes were replaced with accept/reject logic that is deeply tied to the social state existing among the characters.

While authoring content, consisting of social games and their instantiations, for the *Promacolypse* demo, we found that we were building a lot of general social commonsense into the rules for each social game. This repetition of rule writing revealed the need for constructing a mechanism of general social reasoning that would encompass the concerns of many social games. To address this, we developed the structures we call microtheories to capture the social knowledge of how to act in certain social domains (e.g. friends, enemies, low romance network values).

With social games each having an intent—and a large set of microtheories containing rules that influence a character's desire to perform a game, or accept or reject a game, with that intent—social games could focus on what makes that social game unique. For example, the social games *Share Interest* and *Reminisce* are both games with the intent to have another character's buddy network value increase toward the initiator. In general, if two characters are friends, the friend microtheory will increase a character's desire to play both games. However, if the two characters do indeed share an interest, as defined in the cultural knowledge base, the initiating character would be more likely to want to play *Share Interest*. Likewise, if the two characters have a positive history of social interaction the initiator would want to play *Reminisce*. Such specific rules are now the only ones embedded in each social game.

3.3 Fully-Playable Beta Version

Play testing the *Promacolypse* demo brought to light several improvements to the design and AI system based on the data from the play testers. The first was that the game needed more narrative structure than what was displayed in *Promacolypse*. This led to the addition of the story progression, level, and ending structure in *The Prom*. During the tests, the players wanted to solve problems using a third character in addition to the initiator and responder. An example would be to use Zach's friend, Karen, to put in a good word for Zach with Lily. To support this, the beta version has third party social games that can be initiated by the player.

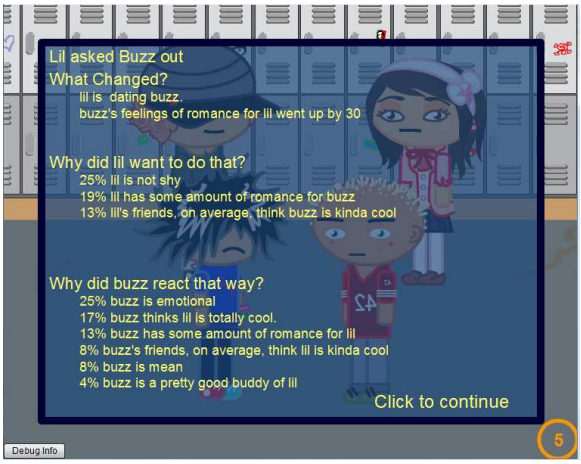

Figure 6. The player is presented with the reasons for why Lil asked Buzz on a date, and why he accepted the invitation.

The players were often slightly confused by the outcomes of social games played in the demo. They asked questions like "why did that happen?", "why did the initiator want to play that game with that person?", or "why did the responder act that way?" We needed to expose the reasoning done by *CiF* in a way that adds to the game experience. Experimentation with displaying this information to the player demonstrated that overwhelming him or her with tables of data was counterproductive. Instead, succinct explanations and narration are reasonable solutions, as can be seen in figure 6.

A lesson learned from both the *Promacolypse* demo and through making the beta version was that players were experiencing the same social game instantiations too often. This problem was two-fold: 1) out of all the instantiations, a subset seemed to be picked more often by *CiF* and 2) there were not enough social game instantiations authored. With the addition of more authors, a social game design tool (a *CiF*-specific content editor similar to level editors commonly found in computer games) and microtheories greatly increased the social games available. The problem of certain social game instantiations being more frequently chosen was primarily attributed to poor tuning of the sets of influence rules found in social games and microtheories. Rule tuning is addressed by methods of static rule analysis and rigorous play testing to determine where the rules produce undesirable game play. This problem also demonstrates how AI-based design brings the AI system and game closer; at the point of tuning influence rules, the effort is spent simultaneously and inseparably on the game prototype and the AI system. Working on one is working on the other.

4. CONCLUSION

The difficulties of creating rich characters in a dynamic social space are long-standing, and many researchers and designers, both in academia and in industry, have been attempting to address them for years.

In academia, and perhaps game studies in particular, novel game AI storytelling systems are regularly imagined. They are conceived, written about, published, and spoken on. It is a tried and true method of advancing the field and, as described above, *CiF* followed a very similar creation process. However, this is all too frequently where the process ends. Theoretically a system becomes complete, the field has been advanced, and it is time to move on. Through designing *The Prom*, we have found that when designing a system for game AI, the process cannot be considered complete until a playable game employing that AI has also been created. Without the creation of a playable model, the AI system, though perhaps theoretically perfect, is still only theory. Putting theory into practice will help refine the theory; it will create a stronger game AI, which in turn will create an improved playable experience.

We realize that this is perhaps easier said than done. Indeed, the inaugural version of *CiF* started its life as an AI system with no game to power; it was conceived, written about, published, spoken on, and even implemented in code, returning very pleasing results whenever asked to run through demo-sized simulations. However, only by using it to power a game was it discovered that several of the components of *CiF* were largely incompatible with the creation of playable experiences. Humbled, we discussed the type of game *The Prom* could be, pondered the necessary changes to the *CiF* architecture such a game would entail, and began evolving both *CiF* and *The Prom* side by side in a positive feedback loop that aided both experiences tremendously. Though the argument could be made that *CiF* is now inextricably linked to *The Prom*, we are pleased to announce that other systems, such as the SIREN project, The Holodeck project, and the Grail GM, have been making use of *CiF* in three very different ways, all distinct from *The Prom*. Developing *CiF* alongside *The Prom* has made it more versatile and feature-rich, not less.

Lest we seem overly critical of academic work, it is also worth noting that work in industry has remained relatively static. Very few new storytelling technologies of note have been developed in recent memory by major companies, with the predominant operational logics of narrative remaining the quest flag and dialogue tree structures that are familiar from generations of role-playing and adventure games. Commercial games' solution to the problem then, if not the development of new technologies, is to simply throw additional authors at the existing technologies. Though certainly capable of producing fantastic experiences, the inherent flaws of these systems, including few opportunities for player manipulation of the social space, remain unaddressed. For example, *Bioware's Dragon Age: Origins* [3] is an incredibly character and plot-driven RPG that frequently asks the player to make decisions pertaining to the story. Though it certainly gives the impression of making these choices matter, subsequent playthroughs reveal to players how small of an effect most decisions actually have, often times being limited to changing a single line of dialogue from an NPC.

We raise these issues not to point fingers or blame, but to encourage and hopefully inspire. We believe that there is a vast amount of untapped potential, just waiting to literally be realized through AI-based design.

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