Authoring Game-based Interactive Narrative using Social Games and *Comme il Faut*

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ABSTRACT

Comme il Faut is an artificial intelligence system and authoring strategy for creating game-based interactive stories about relationships and social interactions between characters. Using the abstraction of the social game, *Comme il Faut* creates experiences where specific dramatic interactions between characters arise from play. This paper describes the process of authoring for *Comme il Faut*. Specifically, we will describe the authoring and design considerations for *Comme il Faut*'s inaugural game, *The Prom*. We discuss how we extracted and encoded an exaggerated social logic from pre-existing media experiences to create its intended story space, developed an idiosyncratic local culture for its story world, defined a set of character histories and personalities to be revealed through play, and authored the specific lines of dialogue and motivating social situations that give the audience experience of *The Prom* its particular character. Together, these produce an experience with much greater fictional specificity than in open-ended simulation games and many more options for what happens (and how things happen) than in traditional game stories.

1. INTRODUCTION

Using traditional authoring methods, an immense amount of authoring is needed to achieve an interactive narrative that is both sensitive to player interactions and an explicit and rich story. Most interactive narratives in games rely on the "beads-on-a-string" approach [1] where sections of relatively free player action are followed by static cut scenes that rarely account for the action the player previously took. To introduce some variation, some games give players a choice between several explicitly authored paths, but this approach quickly results in an impossibly large space to author for that is exponential to the number of interactions accounted for. To minimize this problem of authorial burden and to make play experiences more varied, computational models, such as the ever popular simulations of the physical world, can be used to provide a space of interaction and resulting stories. Computational models make authoring more tractable by allowing the system to manage the mechanics of the space, and thus reducing the number of interaction combinations for which one must explicitly author.

The interactive narratives that result from computational models will of course be a product of what the model is simulating. Because many narratives across all media focus on relationships between characters, we chose to create a computational model of social interaction between characters. However, representing all social interactions, cultural context, and the consequential interactions between the two in their entirety is also an impractical, or perhaps impossible, task. The space of contexts and interactions is prohibitively large — and not necessarily the ideal one for authorial expression. As a result, our goal is to develop knowledge representations and architectures that are rich enough to support interesting social interactions, yet are tractable to implement, and support authored variation.

Designed to address these issues, *Comme il Faut* (*CiF*) is a playable computational model of social interactions designed specifically to allow autonomous characters to play social games [3, 4, 5]. The design goal of *CiF* is 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. In addition, characters are situated in an authored culture (represented by the cultural knowledgebase) and located in an unfolding and growing history (the social fact database) from which they determine many of their choices.

The part of *CiF* where the personality specific behavior with respect to the past and current situation is generated is in *social games*. Put simply, social games are defined as multi-character social interactions whose function is to modify the social state existing within and across the participants. Practically, social games are heavily influenced by Goffman's dramaturgical analysis [2] as a way to encode normal patterns of behavior in terms of how a character would present themselves in order to manage how they are perceived by others.

Social games are an encoding of patterns of behavior that can be used by any character. However, given the history of the characters in the world and current state, the patterns of social behavior described by social games vary in how they help a character to express his or herself (and games may not be available to a particular character at a given moment). Further, the character initiating a social game has different considerations than a character responding to a social game started by another, as they are playing different roles within the game. Also, as described below, the variation in the interaction patterns a character performs is highly dependent on the story developed before the game. Through authoring social games in the logical framework established by *CiF*, characters in the story can choose how they want to manipulate the game world without every choice being explicitly modeled by the author, while still revealing author-defined aspects of their histories, personalities, and motivations.

As noted above, an author using *CiF* doesn't create a static, or even branching, series of events, but rather the logic of a social world, a set of characters, and a series of scenario goals. Because *CiF* is driven by an underlying simulation of social interaction,

Figure 1 A screenshot from *The Prom*.

goals may be met in emergent and unplanned ways, but are always consistent with the designed storyworld.

CiF's first application is in our current project *The Prom*. This is a game-based interactive narrative about a group of primarily counter-culture high school kids in the week before their prom. The player's role is to select what social actions each character takes from a list of their current considerations (e.g., to flirt, share interests with, make a joke at the expense of, etc.). When selected, the interactions are presented as fully specified dialogue between characters. *CiF's* processes determine the social action lists for each character according to their personality descriptions, current relationships, and social history. Each stage of *The Prom* has a scenario objective, which is usually to have two or more characters achieve some social status (e.g., to get two characters start dating each other). The solutions to each scenario goal are completely dependent on the social actions taken in previous stages, the scenario's back story and the choices of social action taken in the current stage. In this way, players of *The Prom* create narratives while working to solve each scenario's dynamic social puzzle.

The goal of this project is not to create an accurate simulation but rather to create amusing and compelling stories and gameplay. Using the setting of a high school before prom allows us to present an exaggerated and superficial set of social logic. The formal and explicit model of social reality that is required by *CiF* begs to be used in parody—and high school, with its emphasis on status, trends, and dramatic social changes has proven to be a good domain to exemplify the strengths of *CiF*.

What follows is a detailed description of what went into using *CiF* to author the game-based interactive story of *The Prom*. However, it should be emphasized that *The Prom* is just one example of how social game-based interactive storytelling works. It is our hope that the techniques and tools described below will inspire other social game based works.

2. AUTHORING USING *COMME IL FAUT*

2.1 System Overview

The social AI system of *CiF* was engineered to produce playable models inspired by Goffman's work and other concepts from the social sciences together with humanities-derived understandings of drama, fiction, and authoring [4, 5]. With respect to authoring an interactive narrative, *CiF* has two major areas of concern: the portion that is meant to be authored and the procedure that uses what is authored to generate behavior (see figure 2 and section 2.3). As we describe below, the agents' trait descriptions, social networks, cultural knowledgebase, social facts database backstory facts, status trigger rules, and library of social games comprise the areas in *CiF* that are to be authored. The procedure generates behavior that is consistent with the constraints of the social world given what has been authored.

2.2 Extracting Social Logic

As mentioned above, the authors have been utilizing *CiF* in the creation of *The Prom*, a game whose mechanics revolve around the manipulation of the tumultuous social landscape of a fictional high school. Accordingly, a significant amount of authoring energy was devoted to determining the types of social behavior the students could engage in, how these behaviors would affect the student's relationships to each other, and determining the basic kinds of relationships we wanted our system to represent. Though a user of *CiF* could simply employ the power of their imagination to fill in the components of the *CiF* architecture to whatever their heart desires, the authors agreed that for the purposes of *The Prom* there was no need to re-invent the social wheel, especially for a space that has been as richly explored as the high school social scene. Countless pre-existing media experiences (PMEs)—

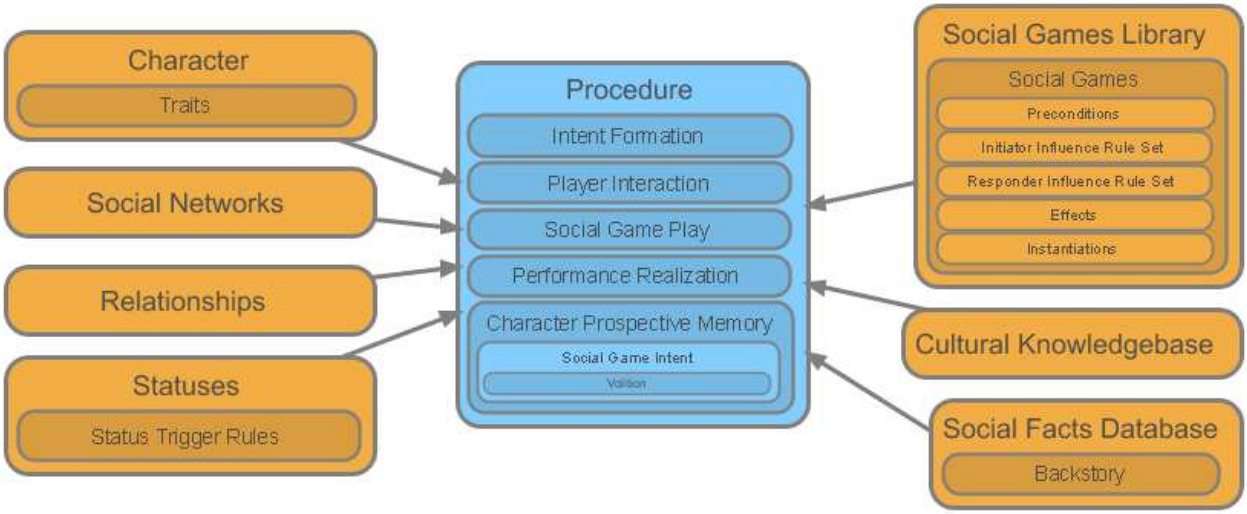

Figure 2 An author-centric view of the system architecture for *Comme il Faut.* The parts of the system that are meant to be authored are the knowledge representation domains and are shown as orange boxes. The process through which *CiF* in *The Prom* uses the authored parts is found the blue "procedure" box.

including novels, films, and plays—have already been authored that evoke some of the plights and pleasures of high school life; as opposed to fabricating our own behavioral rules, we leveraged these PMEs to construct a foundation for typical high school behavior. This served a dual purpose: in addition to informing the types of experiences we wanted our system to be able to model, it also shifted our focus away from other experiences that were not represented in the PMEs we studied. Thus, the PMEs simultaneously provided direction and constraint, rendering a potentially intractable social space into something much more authorable. For the purposes of *The Prom* we primarily relied on two PMEs: the film adaptation of Stephenie Meyer's *Twilight* of the same name [7], and *Mean Girls* [6] a film adapted from Rosalind Wiseman's non-fiction *Queen Bees and Wannabes.* Between these two films, we found a wealth of knowledge pertaining to social cliques and interpersonal relationships that coincided beautifully with the types of stories we wanted to tell.

Our work with these PMEs largely focused on operationalizing them; analyzing the films as a whole, specifically the social interactions between characters, and reducing them into their component parts, such that the elements of social exchange could be encoded into algorithmic rules. In addition, a certain amount of exaggeration was woven into the dialogue to ensure that the message of any given exchange was made readily apparent to the audience. As the source material of both of our PMEs could already be considered exaggerations of "real" social conduct, the dialogue of *The Prom* is somewhat removed from how a typical high schooler might actually speak. This is an intentional decision; the quirky nature of the dialogue's "voice" is intended to clarify changes in game state, as well as to entertain.

2.3 Authoring

In an attempt to clarify our authoring approach and potentially assist future users of the *CiF* system, what follows is a step-by-step guide of the high level authoring decisions that *CiF* requires, using *The Prom* as a case study. Through this guide, our hope is that it will both demystify the internal workings of *CiF* as well as inspire others to tell their own stories using the abstraction of the social game and *CiF*.

2.3.1 Relationships

A good first step when modeling a world of social interactions is determining what types of relationships the author wants the stories told by the system to be about. By relationship, the authors refer to a reciprocal state between two people that holds some amount of permanence; a large part of the play is to either forge new relationships between characters or disrupt old ones. Therefore, these relationships are a central focus of the gameplay and stories told. Picking good relationships is the key to creating a distinct storytelling space. Though *The Prom* only uses three relationship types, more or fewer could be utilized to capture a desired social space. The three types of relationships found in *The Prom* are:

Dating: The two characters are going steady. They are romantically interested in each other, and may even hold hands in public on occasion. If a character begins dating multiple characters at the same time, they will be marked as a "cheater," which would lessen the characters' respect from the general public, though it may actually increase it amongst certain incorrigible youths.

Friends: The two characters get along well with each other. They are likely to like and respect each other, and if the romantic interest is there, this could be a first step on the road to the two characters dating each other.

Enemies: The characters do not get along well with each other. Social exchanges between enemies can be expected to be punctuated with insults and anger. Particularly vitriolic adversaries may even come to blows.

As mentioned above, all relationships are reciprocal. If character Bill believes that he is friends with character Charlie, then Charlie is guaranteed to be friends with Bill as well. (Non-reciprocated

attitudes towards other characters are known as *character statuses*, and will be discussed below.) These relationships help motivate both character and player action—it is interesting to see how a tenuous friendship might devolve into fighting, or how two enemies may develop feelings for each other and ultimately begin to date. However, it was intended that each of these states represent some amount of permanence in the world, and achievement on the part of the player. Getting characters to change their relationships in some way is intended to feel like an accomplishment that is reached through investment in playtime and clever manipulation of the social space, and should not be something that fluctuates quickly with minimum effort. Even in our exaggerated context, it would be unrealistic for two bitter enemies to renounce their animosity and begin dating after a single social game, a second interaction to devolve them to merely friends, and a third to revert them back to enemies. Shifts in relationships should be the culmination of a rich history of interactions between two characters. Therefore, we need characters to be able to interact with each other and play meaningful social games which build up this history and further the development of the characters without the interactions necessarily changing the relationships themselves. This need is in large part the inspiration behind the creation of social networks.

2.3.2 Social Networks

Though the term Social Network might conjure up images of Facebook and MySpace, Social Networks in the context of *CiF* are meant to model high level general attitudes the characters hold towards each other, such as how much respect or romantic interest a character feels towards another. Every Social Network is a bidirectional graph connecting each character to every other character. Each link in any given graph holds a scalar value which represents the strength of the relationship, the higher the value, the greater the strength. Note that, since the graph is bidirectional, the numeric values need not be reciprocated. For example, Charlie may find Bill immensely venerable and respect him at a value of 90, while in turn Bill holds Charlie at a mere 10, regarding him as little more than garbage. Unlike Relationships, the values of a Social Network are very malleable, and are constantly shifting after every social game played. Thus, in addition to interactions which change the Relationships of the characters and are meant to feel like milestones in the narrative of the system, there are interactions which only change the Social Networks, serving as stepping stones towards actually changing a relationship.

When authoring an experience using *CiF*, a good rule of thumb for selecting what Social Networks to use would be to determine the general motivators that might influence characters' desires to engage in the Relationships decided upon. *The Prom* incorporates three social networks:

Buddy: This network represents the general amiability one character feels towards another. A higher value is likely to lead to the characters becoming friends, while lower values could result in the characters becoming enemies.

Romance: This network is symbolic of how much one character is romantically attracted to another. Consequently, a higher value is indicative of a desire to begin dating.

Cool: The final network in *The Prom* denotes how much respect a character has earned in the eyes of another. Since the concept of respect in a high school setting is wrapped up with several other notions, such as *street cred*, authenticity, and popularity, we determined that a network that represented how *cool* the characters find each other successfully captured these connotations.

Already we can see the system beginning to take shape. If the player has a scenario goal of getting two characters that currently lack interest in each other to start dating, potential courses of action present themselves to render the social space amenable to their desires. A straightforward idea to accomplish this would be to instigate social games between the two potential love birds which raise their Romance Network values. However, alternative roundabout methods could be pursued as well. Perhaps if the user wishes for Bill and Charlie to date, she could have Bill raise up his Buddy and Cool network values with all of Charlie's friends. If all of his friends think highly of Bill, then Charlie could potentially be more interested in Bill himself.

This speaks to another prime reason why we chose to ground our interactions in well known pre-existing media experiences. By presenting users with recognizable situations based on PMEs, players will be able to leverage their familiarity with the genre to conceive unique methods to manipulate the social landscape. In this way, even first time players can have an intuitive sense of experiments which could result in Bill and Charlie dating. And just as either a direct or roundabout method can be used to successfully adjust the social networks for Charlie and Bill's romantic affair, so other kinds of social changes can be accomplished by multiple routes.

2.3.3 Social Fact and Cultural Knowledge Databases

To help add character specific flavor to these interactions, we make use of a Cultural Knowledgebase (CKB)—and then to keep track of the specific interactions that led up to social changes, we employ the Social Fact Database (SFDB).

The Cultural Knowledgebase (CKB) allows for the dialogue that the characters share with each other to reference objects and concepts specific to the context of the world's setting (in the case of *The Prom*, a high school). The CKB is populated by the author with objects appropriate to the setting that she wants to model. Each object is assigned a descriptive label such as cool, lame, romantic, etc. This label represents the zeitgeist; the *absolute truth* of the world. For example, the zeitgeist labels homework and cafeteria food as lame, and skateboards and cell-phones as cool. The second label category represents individual character's thoughts on specific objects, which can—and often do—conflict with the vision of the zeitgeist. Characters can either like, dislike, or not have an opinion about an object. For example, if Charlie is a bookish type, he might like homework, even though the zeitgeist regards it as lame. The system can then determine that Charlie likes a lame thing, which can then be utilized in social interactions. If Bill were to engage in an interaction with Charlie with the intention of lowering the value of his "cool" social network with others (perhaps their romance has fizzled out), Bill might specifically cite Charlie's predilection for homework while insulting him as an example as to why he is lame.

This not only helps provide a bit of variety with dialogue exchanges between characters, but it becomes an important way to learn more about the characters themselves. Through exchanges with other characters, the player could learn that both Bill and Charlie like the (generally regarded as lame) cafeteria food, which provides the player with a hint that the two of them have at least a little bit of foundation to get along. And indeed, the two could engage in an interaction in which they excitedly share their mutual

interest, an interaction that could not be had—at least not successfully—with characters with completely dissimilar passions. As information is revealed about the characters, it adds both to the richness of the world, and to the player's ideas for how to go about manipulating it.

Another way that specificity can be inserted into social interactions is through the Social Facts Database (SFDB). This data structure captures information about every single social interaction that transpires throughout the course of the game. In doing this, the specifics of each social interaction, no matter how small, can help contribute to future exchanges between characters. This helps realize the goal of having distinct paths to accomplishing the same result (e.g., the direct path or a roundabout path to dating, as described above), having distinct impacts. Specific interactions can have labels associated with them which can then influence how characters engage with each other in the future. An insult from Bill to Charlie, for example, would be considered a negative act, and in future interactions between Bill and Charlie, the SFDB will be looked at and, when it is discovered that Bill had been mean to Charlie, it will affect the outcome of their exchanges—and perhaps even lead to the specifics of the insult being brought up again.

CiF can also reason over multiple entries in the SFDB to discover particular social states which provide additional richness to character's opinions of each other and knowledge of the world. Let us say that Bill is dating Charlie, but then Bill successfully starts dating another person as well. By noting that there are two simultaneous dating entries for Bill in the SFDB, the system will then mark Bill as a cheater. This could have many varied repercussions down the line—it would certainly negatively impact his relationship with Charlie, and it might prevent him from successfully dating other people in the future—word travels fast in this high school, and once it has been revealed that Bill is a cheater, only those willing to give the two timing dog a chance at redemption will be willing to share their hearts with him.

The SFDB also serves as a means for the author to fill the world with back-story. The SFDB can be pre-populated, before the game begins, with specific social interactions which represent how the initial social state came to be. Entries could describe Bill and Charlie as friends who first met by sharing a mutual interest, but who have a caustic relationship marked with exchanging insults with each other. The player will at first only see a friendship relationship between the two characters (perhaps with a mutually low value on the buddy net to reflect the sting of the insults), but through play references to these entries in the SFDB will eventually reveal the characters' back-story. We believe this to be a relatively unique way of creating the background of a world—it is explicitly written in the language of in-game actions (a back-story SFDB entry will take the exact same form of an entry inserted during actual play), though the way that it is revealed in the discourse of the narrative is not explicitly up to the author, and depends entirely on how the player plays the game.

2.3.4 Character Statuses

Character Statuses can be thought of as temporary, non-reciprocal relationships. For example, let us say that Charlie spurns Bill's advances. Bill, feeling rejected, may develop a sense of enmity towards Charlie. Again this feeling is one sided—Charlie may or may not feel any negative opinions towards Bill—but Bill's enmity towards Charlie can affect all of his other interactions with him, if enmity is present in a Social Game's influence rule sets or preconditions (described below). Character Statuses will dissipate on their own (as more entries are added to the SFDB and the event which sparked the status is relegated further and further into the past), and some social games, such as paying a compliment, might patch up any ill feelings all together.

In addition to resulting from single social interactions (i.e., Social Games), Character Statuses are also triggered from multiple entries in the SFDB. For example, a situation where multiple characters are picking on one character could result in the picked on character becoming depressed. While any one of these actions would not be enough to cause this status, the culmination of them, represented by a Character Status Trigger Rule that recognized when more than three different characters lower their Buddy Network values with a single character in a given time, create the Character Status.

2.3.5 Characters and Traits

As described above, the individuality of characters in *CiF* is defined through their relationships to the objects in the world. Additionally, characters can be assigned traits that dramatically affect their motivations and reactions to the social world. As will be discussed below, traits are static characteristics that contribute to the ranking and results of the social interactions.

In addition to traits, *The Prom* represents characters with animated avatars and a paragraph of prose to briefly describe the character's history and personality. However, these aspects of character representation depend on the interaction model of the experience that *CiF* is driving.

2.3.6 Social Games

With all of this background, we are now ready to explore the heart of the *CiF* system, the Social Game.

What we have referred to generically as social interactions up to this point are in *CiF* implemented formally as Social Games: exchanges carried out with the specific intention of altering the social landscape in some particular fashion. As outlined in the above sections, it is through the playing of social games that the SFDB is filled, the social networks are altered, and relationships are forged and destroyed. In addition to their specific instantiations, a Social Game consists of four components: Preconditions, the Initiator Influence Ruleset, the Responder Influence Ruleset, and the Effects. To help illustrate these components, let us examine an example social game from our system, encoded in XML.

In figure 3, we see the Pick Up Line Social Game, which is an example of a Dating game. That is to say, it is a game that is played by one character with the intention of the dating another by its conclusion. The game only has a single precondition, and that is that the initiator of the social game (i.e. the character which started it) and the responder (i.e. the character that the game was directed towards) are not already dating each other. Indeed, it would be unexpected and awkward for a pair of lovers to

```
<SocialGame socialStatusType="Dating"
        Name="PickUpLine">
        <Preconditions>
                <rule type="!Dating"
                first="initiator"
                second="responder" />
        </Preconditions>
```

Figure 3 The type and preconditions of a social game.

```
<InitiatorInfluenceRuleSet>
    <InfluenceRule weight="20">
        <Predicate type="Network"
            networkType="Romance"
            first="initiator"
            second="responder"
            greaterOrLessThan="greater"
            value="40" />
    </InfluenceRule>
    <InfluenceRule weight="10">
        <Predicate type="trait"
            trait="Confidence"
            first="initiator" />
    </InfluenceRule>
</InitiatorInfluenceRuleSet>
```

Figure 4 The Initiator Influence Ruleset, factors that contribute to a character's desire to play a Social Game of the Pick Up Line Social Game.

perpetually ask each other out on a first date! Note, however, that the only stipulation is that the pair is not dating each other—they could potentially be dating other people, which renders the cheating scenario described above a viable possibility. Thus, preconditions are only to be used to prevent scenarios, and an author should be careful not to limit interesting dramatic scenarios by encoding too many precondition rules.

For each social change pertaining to either a network value change or a relationship change there is a type of social game. While Pick Up Line is an example of a game that a character may play to begin dating another, there are games that characters play to end the relationship of dating (e.g., the Just Want to be Friends game). Thus there are 12 social game types in all: Friend, Not Friend, Dating, Not Dating, Enemy, Not Enemy, Buddy Network Up, Buddy Network Down, Romance Network Up, Romance Network Down, Cool Network Up, and Cool Network Down.

```
<ResponderInfluenceRuleSet>
    <InfluenceRule weight="20">
        <Predicate
            type="trait"
            trait="SexMagnet"
            first="initiator" />
        <Predicate
            type="trait"
            trait="Shallow"
            first="responder" />
    </InfluenceRule>
    <InfluenceRule weight="-20">
        <Predicate
            type="CKBEntry"
            first="initiator"
            second="responder"
            firstSubjective="disagree"
            secondSubjetive="disagree"
            label="Romantic" />
    </InfluenceRule>
</ResponderInfluenceRuleSet>
```

Figure 5 The Responder Influence Ruleset, the considerations of the responder, for the Pick Up Line Social Game.

Figure 4 shows the Initiator Influence Rule Set for the Pick Up Line Social Game. The influence rules are meant to capture how deeply the initiator wants to play this particular social game with the responder. If the interest is not high enough, then players will not be given the option to engage in this social game—the player cannot force a character to engage in behavior which is too far removed from their natural behavior. Here we see there are two influence rules. The first looks at the romance network from the initiator to the responder, and if the value is greater than 40, then 20 abstract points of encouragement are tallied in favor of the initiator wanting to play this game. The second looks to see if the initiator has a specific character trait, in this case the trait Confidence, and if so, then another 10 points are added to the motivation bucket. Remember that the player's form of interaction in *The Prom* is to select from the highest ranked Social Games. This tallying of the Initiator Influence Sets is how each Social Game is ranked.

Figure 5 shows a subset of the Responder Influence Rule set (the actual set includes additional rules which have been omitted for brevity). The structure is identical to what we have seen, though the weights of the rules now bear a slightly different meaning. The responder is not determining to what degree she wants to play that particular Social Game, but rather whether or not she responds favorably or not to the initiator's intention for the game. In this case, the initiator's intention for the game is to Date. The first rule is akin to what was seen in the Initiator Influence Rule Set, with the exception of a single rule consisting of two predicates—that is, in order for the rule to be flagged as true, both the initiator must have the character trait of *Sex Magnet* (i.e., being wildly attractive), and the responder must have the trait of being *Shallow* (a trait that is used to describe those that place great value in

```
<Effects>
    <Effect id="I">
        <Predicate type="accept" />
            <socialChange
                type="socialStatus"
                socialStatusType="Dating"
                first="initiator"
                second="responder" />
    </Effect>
    <Effect id="II">
        <predicate type="accept" />
        <predicate type="trait"
            trait="SexMagnet"
            first="responder" />
        <socialChange
            type="socialStatus"
            socialStatusType="Dating"
            first="initiator"
            second="responder" />
        <socialChange
            type="gainTrait"
            trait="Confident"
            first="initiator" />
    </Effect>
</Effects>
```

Figure 6 The Effects, possible outcomes, for the Pick Up Line Social Game.

physical appearance). The second is an example of leveraging the power of the Cultural Knowledgebase. In this rule, the subjective opinion of the two characters is taken into consideration on an item that the zeitgeist has labeled as 'romantic.' In order for the predicate to be considered true, the initiator and the responder must hold differing opinions on the item, that is to say, the initiator might like the romantic object selected, while the responder might dislike it. If the rule flags as true, then it will detract from the responder's motivation to accept the social state change. Based on whether the sum of the true predicate is either positive or negative, the responder chooses to either accept or reject the intention of the initiator and the Social Game.

Figure 6 shows two examples of Effects. Effects are sets of rules and social changes that ultimately determine how a Social Game will play out. The first (with an identity of "I"), is a simple, somewhat flavorless accept rule. This means that the responder accepted playing the social game, but that no other pertinent information held true. The actual result of this is that, as was intended by the game, that both the initiator and the responder are now dating. The second rule is a little more interesting. Again, it is of type accept—the responder acquiesced to the initiator's smooth moves, but here we have an additional predicate in the form of the responder holding the Sex Magnet trait. If both predicates hold, then not only will the initiator and the responder start to date, but the initiator will actually gain the character trait of Confident as well, that is to say that, based on the current social state of the world, the social game resulted in side effects in addition to the intended social state change. When more than one Effect is possible, all the predicates are true for more than one Effect ID, the Effect to be chosen is determined through the notion of saliency—the effect with the highest salience is the effect which is ultimately chosen, where saliency simply refers to the number of predicates that constitute the effect.

```
<Instantiation id="I">
 <LineOfDialogue lineNumber="1" line="I lost
     my phone number… can I have yours?"
     speaker="initiator"
     initiatorBodyAnimation="accuse"
     initiatorFaceAnimation="happy"
     responderBodyAnimation="accuse"
     responderFaceAnimation="happy"
     time="5" />
 <LineOfDialogue lineNumber="2" line="Sure
     thing Tiger! It's…" speaker="responder"
     initiatorBodyAnimation="idle"
     initiatorFaceAnimation="happy"
     responderBodyAnimation="accuse"
     responderFaceAnimation="happy"
     time="5" />
 <LineOfDialogue lineNumber="3" line="Why
     don't we just cut out the middle man…
     I think you're something special, (Y
     NAME). Wanna date?"
     speaker="initiator"
     initiatorBodyAnimation="accuse"
     initiatorFaceAnimation="happy"
     responderBodyAnimation="idle"
     responderFaceAnimation="happy"
     time="5" />
 <LineOfDialogue lineNumber="4" line="Heh,
     why not." speaker="responder"
     initiatorBodyAnimation="idle"
     initiatorFaceAnimation="happy"
     responderBodyAnimation="accuse"
     responderFaceAnimation="happy"
     time="5" />
</Instantiation>
```

Figure 7 The performance information for each character that result from Effects.

As demonstrated above, in addition to changing Relationships between characters or adjusting the social networks, Social Games can affect Character Statuses as well.

Finally, we have an example of an actual instantiation of a social game—this is the dialogue that will ultimately be presented to the user. Each line of dialogue consists of the text itself, as well as the appropriate animations for both the initiator and the responder. This gives the author good control over every line of every exchange, yet still maintains a degree of flexibility to ensure that the social game could be played in a variety of situations. For example, the (Y NAME) would be replaced with the actual name of the responder during performance realization (handled by *CiF*).

After a single game is played, changing the social world and revealing what it does about the characters, the world subsides—giving players an opportunity to reflect on the story so far, examine the next possible actions, and decide where to the *The Prom*'s world next.

3. CONCLUSION

To author an experience using *Comme il Faut* one needs to fill in its provided model of a storyworld's social logic. Unlike other simulation based games that can be understood as story systems, *CiF* creates specific stories (in which characters with histories and personalities speak language and take particular actions that become part of the world's history) and unlike many games with specific stories the gameplay itself is intimately related to the stories it creates. This approach for game-based interactive narrative allows for rich storytelling where player's actions meaningfully affect the story without needing an author to handcraft impossibly huge branching structures.

CiF demonstrates how social games can provide a useful abstraction for authoring interactive stories. By managing character personalities, traits, social games, personality moves, and social statuses, *CiF* creates a complex and intricate story world that is comprised of both its history and emerging future. Among the tasks involved in creating a story to match the formal model are creating and aligning characters with personality descriptions, creating a knowledge base of cultural facts consistent with the story's cultural basis, developing a history of relevant social facts that comprise the back story, and authoring prose to be displayed that utilizes the developed history and cultural knowledge base.

By creating a story world, rather than specific instances of stories, there are a very large range of potential stories, and many that authors would likely not even anticipate. Because *CiF* is a framework for authoring rich simulations of social interactions that are specific to an author's vision for their fictional world, many individual narratives can result from interaction. Enabled by *CiF*, *The Prom* demonstrates how navigating the social space of

characters to solve social puzzles with multiple dynamic solutions creates compelling gameplay scenarios and stories.

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