

Comme il Faut 2: A fully realized model for socially-oriented gameplay

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ABSTRACT

Social games—common patterns of character interactions that modify the social environment of the story world—provide a useful abstraction when authoring a story composed of interactive characters, making it possible to create games with deep possibility spaces that are *about* social interaction (which would be intractable if hand-authoring all the options). In this paper, we detail the workings of a major new version of our social artificial intelligence system, *Comme il Faut*, that enables social game play in interactive media experiences. The workings of *Comme il Faut 2* are shown, with running examples, from both knowledge representation and process perspectives. Finally, the paper concludes with a plan for evaluating and demonstrating *Comme il Faut 2* through an implementation of an interactive media experience that consists of a playable social space.

1. INTRODUCTION

The process of authoring a compelling interactive story can be difficult and time intensive. The difficulties faced by authors increase dramatically when the actions of the player have a large impact on the interpersonal and social aspects of the game world at interpersonal or social levels. For example, one of the largest interactive text-based fiction works to be produced, *Blue Lacuna*, features a story in which the interpersonal relationships between the characters is largely determined by the choices the player makes in game play [13]. This work, evidenced by the large amount of code that constitutes its implementation, was created through an immense amount of authoring. Because of this authoring burden, most character-based games avoid making social relationships dependent on gameplay.

As another example, the upcoming MMOG *Star Wars: The Old Republic* [2] advertises that it will be able to develop each player character’s individual story, but makes no secret of the fact that this comes at the cost of over two years of authoring for a team of twelve writers and a skilled lead writer whose job is to maintain consistency. Clearly, the budget alone for this sort of project makes this approach undesirable, and we still have yet to see to what extent *Star Wars: The Old Republic* will manage to be a compelling interactive story.

To better facilitate the authoring of interactive narrative experiences such as *Blue Lacuna* or *The Old Republic*, better tools for enabling social and interpersonal interactivity are needed. Currently, interactive experiences such as 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. We wish to enable play in the social space like play is enabled in physical space.

The interactive narrative that is closest to offering a high level of social play is the experimental game *Faade* [10]. However, *Faade* is a game of limited duration that has only two well-defined social games (an “affinity game” and “therapy game”). Even with this limited scope, the authoring process for creating *Faade* was very time intensive and would not scale well to a larger work of fiction. Further progress requires an approach that can address the authoring bottlenecks found in all approaches, while defining a path toward the deeper social gameplay found in *Faade*.

In our initial work toward creating a playable social model, we leveraged Goffman’s dramaturgical analysis [6] to encode patterns of normal social behavior to create a useful abstraction for enabling social play—we call these *social games* [11]. Growing from those found in *Faade*, social games have been defined as multi-character social interactions whose function is to modify the social state existing within and across the participants.

Comme il Faut (CiF) is a playable computational model of social interactions designed specifically to allow autonomous characters to play social games [11]. 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. This goal is difficult to achieve with only computer science and software engineering. To address this, *CiF* draws from knowledge from sociology and psychology, and their subfields of micro-sociology and social psychology, as well as from knowledge of authoring and drama. By designing a system with an emphasis on social games, social games themselves were subject to a higher degree of design and refinement.

In this paper, the design refinement and implementation of *CiF* are detailed through a description of the current state of the system. Throughout the description, the results from the processes of iterative design and prototyping that *CiF* has undergone are discussed.

2. RELATED WORK

As *CiF 2* reasons over authored characters and a social story world to generate a new story state and story events, it has

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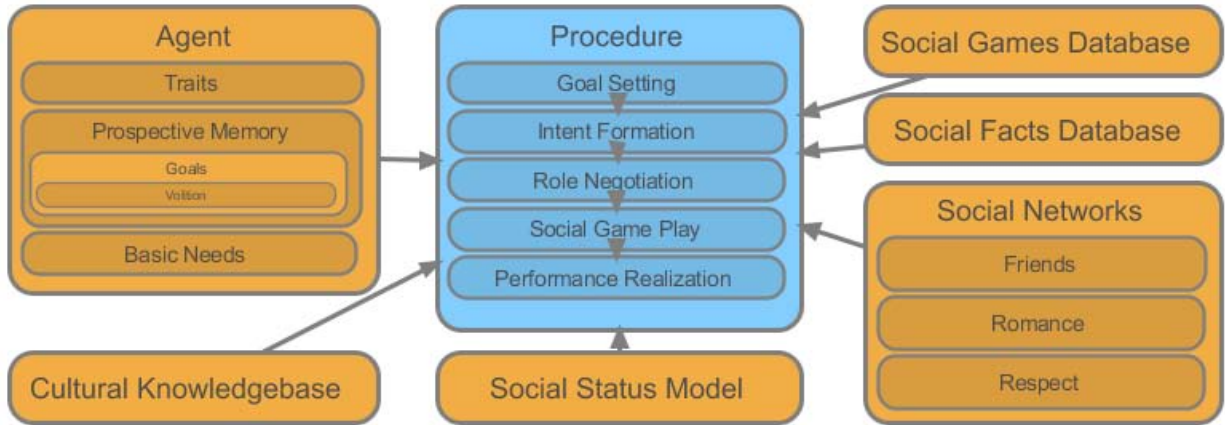


Figure 1 The system architecture for *Comme il Faut 2*.

commonalities with other interactive storytelling and story authoring systems. There exist several systems that create stories with an interactive authoring component [16][17][18]. Each system lessens the authorial burden in creating an interactive narrative in specific ways ranging from author-based story generation to responding to natural language author input by creating the next sentence in the story. We provide an authoring framework specifically designed to ease authorial burden through the encoding of social games and the rules of a culturally grounded social space.

While it is designed to be used in interactive narratives, *CiF 2* is a simulation of a social environment based on computer science, social science, and the humanities with the goal of manifesting believable character behavior. Other simulations aimed at believable agent behavior that are based in social science or the humanities are [4][8][15][9].

Some of the systems share *CiF 2*'s use of cultural norms [5] but do not share the patterns of social behavior between characters aimed specifically at social state manipulation that is used by *CiF 2*.

3. COMME IL FAUT REVISITED

The social AI system of *Comme il Faut* was engineered to produce playable models inspired by the previously described concepts from the social sciences together with humanities-derived understandings of drama, fiction, and authoring. The two categories of system entities are data representations of character knowledge and process representations. Social games, personality descriptions, and social state are the data the system stores. Goal setting, intent forming, social game negotiation, and performance realization are the processes through which the data is modified during system execution. The illustrative examples that follow use the setting of the *CiF 2* prototype, *The Prom*. The setting of *The Prom* involves a group of *alternative* high school kids (e.g. Emos, Goths, Geeks, etc.) and their dramatic lives as they prepare for the upcoming school prom (a full description is in section 4).

The emphasis of the system is on *social games*: multi-character social interactions whose function is to modify the social state existing within and across the participants. In the same way that playable models of physics in combat games do not seek to model

real physics, but rather take inspiration from physics to create a compelling experience, our playable model of social games does not seek to accurately model social cognition, but rather takes inspiration from a variety of social and psychological theories to create a model that underwrites compelling, playable experiences.

The previous implementation of *CiF* focused much more on individuals and their psychological needs [11][14]. 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, *CiF 2* shifted its focus to the logic of social statuses and relationships between characters. Psychological needs are still involved as are several other newly added structures.

The remainder of this section explains the details and problems of implementing a social AI system like *CiF 2*. The areas in which the problems lie range across representing behavior and their contexts; the level of abstraction that the patterns of behavior should take; how to allow for personality specific variation of social behavior; and how to procedurally set goals for characters to follow. These problems will be addressed through techniques inspired by the works of Goffman [6], Berne [1], and Reiss [14].

3.1 Knowledge Representation

The social world is composed of characters with personality descriptions. As described below, personality descriptions are a composite of character-specific entries in the social facts database and cultural knowledgebase, their links in the social networks, character traits, basic needs profile, and goals in the character's prospective memory.

3.1.1 Social Facts Database

In its previous incarnation, the social facts database was a simple, chronological listing of the back story and events that occurred during game play in propositional form (e.g. "Edward dating Lily"). As the social space reasoned over by *CiF* increased in complexity, the need for a more detailed listing of social facts became apparent. The blanket term for what needed to be added to the representation of social facts was context; including a more

detailed sense of time, what social game the social fact took place in, what characters were playing the game and what changes in the social network occurred. All of this and more is present in the remodeled social facts database.

The social facts database is internally represented as a vector of social facts, where a social fact is our notion of any interaction or event that transpires within and consequently alters the game world. Specifically, a social fact consists of the following information:

- What *social status* the social game is affecting (see section 3.1.4).
- The ID of the *initiator* of the social game.
- The ID of the *target* of the social game.
- The ID of a *third party*, if any, involved in the social game.
- The *title* of the social game itself. (e.g. “AskOut”)
- A vector of specific *topics* that were brought up in the social game.
- A vector of *choices* that were made in the social game.
- The relative *time* within the game world that it took place.

While the concepts of the *initiator*, *target*, *third party*, *title*, and *time* are relatively straight forward, we shall now attempt to clarify the more system-specific terms. *CiF 2* keeps track of various *social statuses*, where a social status refers to either a Boolean relationship between two characters (e.g. Dating or ~Dating), or a scalar representing the degree of a single character’s feelings towards another (e.g. how much romantic interest one character has for another). Though the specifics of social games will be outlined in section 3.2.4, it will aid the reader’s understanding of the social facts database to know that every social game is played with the intention of affecting one of these aforementioned social statuses. Thus, it becomes useful to decouple the potentially synonymous notions of social facts and social games, since there are other events besides social games, such as personality moves, which can affect a social status.

The *topics* are specific snippets of filled template dialogue that the characters spoke while playing the specified social game. For example, when initiating AskOutWithGift, a character may

present the object of their affection with either a box of chocolates or a bouquet of flowers—the topics vector in a social fact will remember what was picked, thus making it available to be potentially referenced in future social games (perhaps in a RememberTheGoodTimes social game, in which the initiating character brings up details of when the initiator and the target first started dating). Finally, since any social game has a chance to chain to another upon completion (again, further covered in 3.2.4), the *choices* vector captures which social games, if any, were chosen to be played after the current one.

It is important to note that the social facts database is also used to store the initial state of the game world, or rather the *back story* of the world. By simply populating the database with a handful of facts upon the game’s startup, it gives characters specific relationships, like Dating, with each other. More than this, by leveraging all of the power of a social fact, it allows this back story to be modeled by entire, specific events, such as *Edward asked Lily out with chocolates but she rejected him*. These events can then be revealed to the player through the course of game play, allowing the player to slowly piece together the history of the story world as the game progresses. Additionally, back story facts can be searched and reasoned over like any other social fact, and can thus be used to help inform which (and how) future social games play out.

Though this is a lot of information to store for every social fact, it enables searching a wide array of criteria in determining future social games to be played, and can capture some fairly complex concepts. For example, characters are encouraged to not date the former lovers of their friends, or in the language of the social facts database, if the recipient and the third party have the current social status of friends, and there exist both entries of the recipient and the third party Dating and ~Dating, then the initiator will be less likely to successfully engage in a Dating social game (such as AskOut) with the recipient. Additionally, each social game has been tagged with specific attributes (e.g. Lily spurning Edward’s advances would be considered a *negative act*) which can be used for reasoning purposes as well. The amount of data also provides a satisfying amount of richness in future social games played, as evidenced in the RememberTheGoodTimes example.

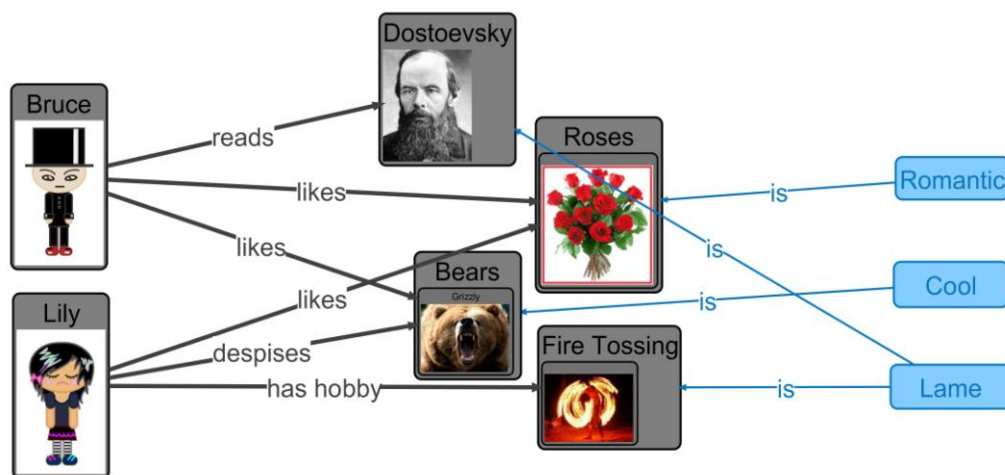


Figure 2 A small example cultural knowledge base for Bruce and Lily.

3.1.2 Cultural Knowledgebase

The cultural knowledgebase is a pool of information shared with all characters that stores culturally relevant information about artifacts and topics in the story world. The cultural knowledgebase stores two categories of information: the cultural norms associated with a cultural knowledge base entry and how individual characters are associated with entries. This knowledge base is used to represent character personalities and to identify similarities between characters in social game instantiation.

Furthermore, this knowledgebase is what enables an author to distill a particular cultural space. The knowledgebase's entries constitute the specific objects of the story world and how each object is generally evaluated and interpreted to all characters. In short, the cultural knowledgebase defines the zeitgeist of the story world and how each character relates to it. For example, consider a situation where the character Edward is defined to like, or linked to, the object roses, and roses are defined to be considered romantic. In this way, *CiF 2* works with the cultural knowledgebase to formally define and reason over the material world of distinct characters.

The knowledgebase was constructed using the Visual Understanding Environment (VUE) tool. Because of this program's intuitive interface, this tool enabled the team to utilize the help of undergraduate research assistants with no prior knowledge of *CiF*.

3.1.3 Social Networks

Social Networks are a metric the *CiF 2* system uses to measure the relationship between any two characters—every character in every net has a link to every other character, and no character has a link to themselves. In the game world of *CiF 2*'s prototype, *The Prom*, there are three social networks: a Relationship Net, which is a representation of all of the character's general friendliness and attitude towards the rest of the group, a Romance Net which measures how interested characters are in pursuing intimate (well, smooching and hand-holding) relationships with each other, and an Authenticity Net is an approximate record of how much respect every character has in the eyes of their peers.

Like the contents of the social facts database, the three social networks are used to help determine which social games should be played. Functionality is in place to not only find the specific scalar values between two people (e.g. Edward's romance towards Lily, and vice versa), but discover entire groups of people that meet certain criteria. That is to say, we can easily find everyone in the space whose romantic interest in Edward is above some threshold, say 70. This data in turn can be used as part of the game selection process (perhaps someone being universally adored makes that person more attractive and increases the probability of AskOut social games being played with them), as well as within the social games themselves (e.g. Lily might mention the other potential suitors by name when inquiring that it is her, and only her, that he loves). Other interesting pieces of information such as one's relative value of respect in the world can be derived by examining every other character's authenticity value towards this person and taking the average, and can likewise be applied in much the same way as the aforementioned.

3.1.4 Social Status Rules

Social status rules are the preconditions that must first be met before a game initiating a social status change can be played. They are essentially a listing of horn clauses, where the head is the social status change in question, and the conditions of the

body are checked against the social facts database and the social networks (discussed below). One such social status rule might be:

$$\text{Dating}(x,y) : \text{rel}(x,y) > 70 \wedge \text{rel}(y, x) > 70$$

In this simple example we see that the social status change is dating between two arbitrary characters x and y . The preconditions to satisfy this rule, and thus what needs to hold before any Dating social games between x and y may be played, are that x 's relationship towards y be greater than 70, and y 's relationship towards x must also be greater than 70. If a character has a goal of Dating another, but the social status preconditions have yet to be met, then they will first need to engage in social games which help to satisfy the preconditions. In this example, it would entail games which raise the relationship network of the two characters.

The above was a relatively simple example, but the system permits additional complexity, namely the ability for there to be multiple ways to satisfy the preconditions. Take, for example, the social status precondition before two characters can start physically fighting with each other:

$$\text{Fighting}(x, y) : \text{Enemy}(x, y) \wedge \text{Provocation}(x, y)$$

In order for two characters to be fighting, they must first be enemies, and there must be an act of provocation between them, where provocation is defined by:

$$\begin{aligned} \text{Provocation}(x, y) : & [\text{NegativeAct}(x, y)] \\ & : [\text{NegativeAct}(x, z)] \wedge \text{Friends}(y, z) \\ & : [\text{NegativeAct}(x, z)] \wedge \text{Dating}(y, z) \\ & : \text{Abusive}(x) \end{aligned}$$

Here, we see an act of provocation is either an event tagged as a negative act between the two characters directly (the $[\]$ notation means that this event happened in the past and can be sought in the social facts database), or one of the characters must have engaged in a negative act against someone close to the other (either their friend or their main squeeze). Finally if one character simply has the character trait of abusive, then that is all the justified 'provocation' they need to come to blows.

3.1.5 Personality Description

The personalities of characters are primarily distinguished in this system through the aforementioned methods of knowledge representation. Each character's personality is partly described by three elements: their world history through their associated entries in the social facts database, how they fit into the broad cultural space through their associations in the cultural knowledgebase, and through the current state of the social environment denoted by their weights in social networks.

Personality descriptions also have areas of representation that are character-specific in a way that the social networks, social facts database and cultural knowledgebase are not. These areas of representation are character traits and basic needs. Character traits denote very specific behavioral patterns that feature prominently in the social decisions made through executing *CiF 2*. Traits have broad effects that range across the entire process of *CiF 2*: they modify social status rules, feature prominently in the decisions made in social games and modify the priority of the character's goals. As seen in the previous-mentioned social status rule, *Provocation*(x, y), the *abusive* trait allows an additional avenue for a character to interpret the current social state as a provocation. Specifically, if a character, Edward, was considering

the *Fighting*(x, y) rule and Edward had the abusive trait (denoted by *Abusive*(Edward)), he would need no other reason for provocation as his abusive nature provides all the provocation he requires. Edward's abusive personality trait also manifests itself when reacting to social games: when reacting to a game where his relationship with another may be lowered, he is more likely to react by verbally abusing the character that put him the situation.

Through the design process, *CiF 2*'s reliance on Reiss' basic needs [14] has been reduced. Specifically, we realized that when making the basic needs of the characters their primary consideration, the actions of the characters are focused more on their internal state than on manipulating their social environment. To address this, the concept of a character's basic needs states was reduced in importance by making them be only a part of the goal setting process and by reducing the influence they have on choosing paths through a social game. Basic needs still retain the functionality of modeling basic need satiation over time and help to make the character a more individual personality.

3.2 Process

Below are the details for how *CiF 2* reasons over and assigns volition scores to all social games for each agent, selects what games will be played and with who, as well as how each agent reacts to the social games that others play with them.

3.2.1 Goal Setting

Goal selection serves as the starting point for an iteration of the social AI system. Invoked on a per-character basis, this portion of *CiF 2*'s process is responsible for creating a weighted goal set from which a character can determine what social changes are in his or her best interest. Volitions are the weighted value associated with goals that represent the character's desire to complete that goal. Goals and their volitions are stored in the character's prospective memory which is designed to manage goals as the social environment changes. Goal volitions are used to compare goals and determine what actions to perform to achieve their goals.

In *CiF 2*, goals are derived from the system of social status rules and the current social state. An important distinction made in the goal setting process is that between actual social statuses and possible social statuses. Edward and Karen being friends is an actual social status while the social status rule of *Friends*(x, y) evaluating to true when x and y are mapped to Edward and Karen means that social status is possible. When the actual social status is false (i.e. Edward and Karen are not actually friends) and the possible social status true (i.e. the rule *Friends*(Edward, Karen) evaluates to true), a goal is created to make that possible social status realized as an actual social status. In this case, the goal *Friends*(Edward, Karen) is given a volition score based on the body of the social status rule.

As each of the rules reduces to a system primitive (such as a social fact, something true in the world model, or a threshold on a social network value), each of the primitives is given a volition and set as a goal each time it appears in the body of a social status rule. The goal, its social status rule context, and the volition value are stored in the agent's prospective memory.

Character traits provide volition bonuses to goals when the conditions consistent with that trait are met. For example, the trait *SexMagnet* provides a volition modifier in certain situations that involve the dating social status or the romance social network. For

example, if Lily had the sex magnet trait, represented as *SexMagnet*(Lily), and Edward was evaluating the goal of *Dating*(Edward, Lily), the goal would have increased volition.

It may be, and is often, the case that two characters have a social status but the preconditions for that status are no longer met. For example, consider a scenario where Edward and Lily are dating but then Edward insults one of Lily's friends, and Lily responds by lowering her relationship net value toward Edward so much that it no longer meets the preconditions for them to date. In this case, Lily's volition for *~Dating*(Lily, Edward) would receive a bonus. In other words, Lily would want to break up with someone that she doesn't like anymore. However, Edward and Lily will remain dating until the social game *~Dating* is actually played.

3.2.2 Intent Formation

Broadly, the intent formation process takes a character's set of volition and goal pairs, ranks social games by their intended outcome with respect to his or her goals, and picks a social game to initiate.

The choice as to which social game to play from the ranked list of goals is not necessarily as simple as selecting the highest ranked volition. During goal setting, it is often the case that social games may be ranked many times as they are preconditions to other social games. For example, an agent may have a high volition to ask another to date and become friends which both involve the relationship up game. How to handle this apparent increased volition to enact a relationship up game can be handled in different ways. The system could simply choose the highest scored game, add the repeated games volitions together, average them or any other number to options. The method for handling the repeated social games goals could be used as another facet of personality description. For example, a rational mind would add them, a single-minded person takes highest ranked, etc.

However, for *CiF 2*'s prototype, *The Prom* (described in detail in section 4), the player assigns each character intention from the top ranked volitions while strategizing to create a social state.

3.2.3 Role Negotiation

Unlike the original *CiF*, role setting is not done independently of scoring volitions for social games as the goal setting process takes specific characters and social games together. In other words, when a social game is initiated, the roles are set by its initiator.

3.2.4 Social Game Play

Once the social game and involved characters are chosen, the social game must be run and the outcomes calculated. Each game is an instance of a class of games which share the same set of success factors and possible outcomes (e.g. *AsksOut*, *RelationshipUp*, etc.). The class representing all dating games can provide representative examples of the relative complexities of each success factor. A simple factor that goes into choosing whether or not one agent is willing to start dating another is simply whether or not the initiating agent has the 'hottie' trait. At the complex end of the spectrum, there is a factor that reduces the game's success chances if the initiator is too similar to another with whom the target has previously had a bad experience. To combine these into a concrete example, if Edward asks Lily out, Lily's may be quite interested since Edward is a hottie (has the "hottie" trait) and has a lot of friends, but since Edward also reminds her of Bruce whom she dated and had a messy-break up with recently, she eventually decides to turn Edward down.

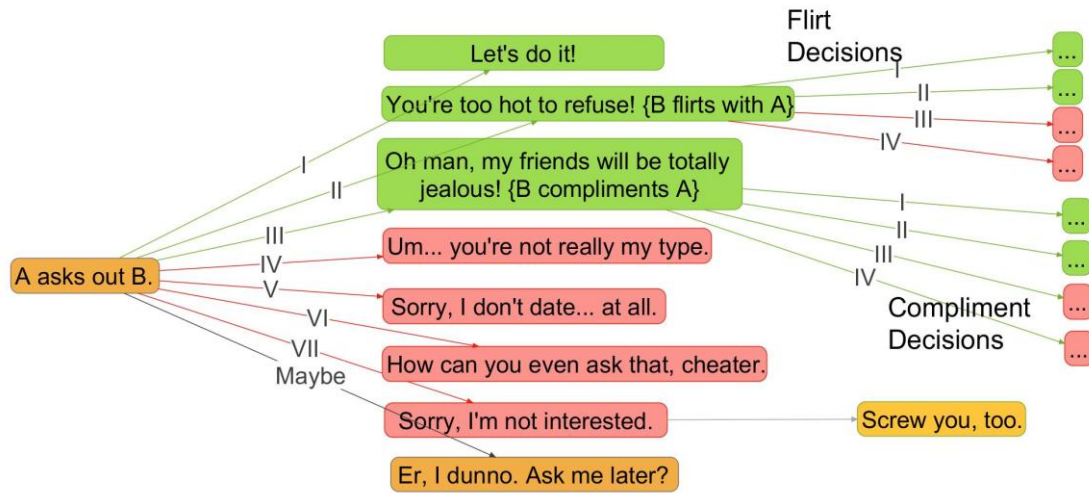


Figure 3 The AskOut social game. The sentences in the events in the second column represent the tone of several lines of dialog between characters engaging in the social game.

In addition to the success factors, each class of games also has a fixed list of possible results. These results are split into three groups: positive, negative, and neutral. Positive results cause game state changes that are in keeping with the intent of the game (i.e. dating games cause two characters to start dating,) negative results cause no change or changes which are opposed to the game's intent, and neutral results are effectively negative but help to indicate to the player that the game is in a nice grey area and could easily succeed or fail in the future with minimal changes to the game state. The choice between positive, negative and neutral results is based on the sum of all of the influences of the game's factors (e.g. if the initiator has the trait "hottie", what the agent's friends think about the initiator, the romance net values, etc.) and the choice between the various results within the positive, negative, and neutral groups is based on the single most important factor contributing to the overall result of the game. An example can be seen in figure 3 in which Edward might ask Lily out and the most salient reason why she accepts is because Edward is a hottie. As a result, outcome II is chosen with its accompanying dialogue acts.

Oftentimes social acts are not performed alone. If Edward were to give Lily some chocolates and does not get rebuffed he might just walk away happy that he had accomplished his goal, or he might be interested in then asking Lily out. Chaining two games together uses a similar decision process to the success or failure of a social game. The difference is that all of the factors add their own weights to the likelihood that an individual game will be chained to a next and then whichever game has the most weight and is above a minimum threshold will be played immediately after the first is completed. In the above example, after Edward gave Lily her gift, the system would make a number of calculations such as whether Edward and Lily have an adequately high romance score, whether they share enough traits, and whether or not Edward currently has the 'smelly' *temporary* trait (characters can have temporary traits based on the social facts database). Because he isn't smelly and Edward and Lily do have a high enough romance score, Edward will likely chain a dating game immediately after his gift giving. An example of chaining social games is represented in figure 3 by the *{B flirts with A}* that follows from the "hottie" response (response II) to A playing the AsksOut game

with B. The secondary arrows that are labeled the "flirt decisions" refer to A's response to being flirted with by B.

Once all of the relevant decisions have been made as far as what games are being played and what their outcomes are, dialogue still needs to be displayed to the player. A subroutine in the engine handles the text generation by semi-randomly choosing one of the many speech acts that has been authored for each game and result and filling in any templated areas to add relevant social or cultural facts. The resulting text is displayed to inform the player of what actually transpired.

4. EVALUATION THROUGH IMPLEMENTATION

The design of *CiF* has evolved as the system went through the transition from concept to code, but the most information relevant to improving the system design was learned through creation of the playable prototype [11]. As described above, we used what we learned to revise *CiF* and are currently in development on the next prototype titled *The Prom*. What follows is a general description of *The Prom* and an introduction to how *CiF 2* and the concept of social games are utilized to create novel gameplay and interactive stories.

The Prom, pictured in figure 4, is a game where the player manages the social life of a group of high school students and creates the situations from which dramatic, thought provoking or at least funny stories can unfold. Through creating friendships, making people become enemies, controlling who gets to be in the "in" crowd and much more, the player can shape the social world of the characters. Each character has a distinct personality represented by interests (e.g. what bands they like), needs (e.g. a character may need to demonstrate a certain degree of dominance over others), traits (e.g. being a particularly jealous person), social networks (e.g. to what degree a characters like, are attracted to or respect one another) and social status (e.g. who is dating who).

In each stage of the game, the player attempts to meet a *level objective*. Level objectives are made up of particular social states (e.g. make it so Edward and Lily are dating). The player's ability to accomplish these is to select what social actions characters pursue in order to create a situation where the objective is possible



Figure 4 A screenshot from *The Prom* that demonstrates the social games that the player could select for Bruce (yellow) to play with Edward (green).

given the social state. What social actions are available to assign to players come from the goal setting stage of *CiF 2*. Not all social actions will result in the desired or even favorable outcome to the initiator of the action, as all changes to the social status and social networks depend on the social state of other the characters involved.

As a simple example, imagine that a level's objective is to create the social status that Edward and Lily are dating. It may be the case that Edward wants to ask Lily out, but upon investigation, players can view the social networks and statuses, the player sees that Lily is not interested in dating him because her link to him in the romance and friend network is very weak. If the player assigned Edward the task to ask Lily to date, Lily is likely to say no. To be able to get Edward and Lily together, the player would first need to raise Lily's opinion of Edward. To do this, the player could assign Edward the social game of "winking" (i.e. slightly raising romance) with Lily. Assuming Lily accepts the wink as a romantic gesture, which is determined by *CiF 2* and the *raise romance* decision hierarchy, the player would then have a better chance of getting the intended result when Edward is told to ask Lily to date.

As alluded to above, not all attempted social actions that the player sets for a character to pursue play out as intended as most of actions depend on the rest of the social space (i.e. Lily wouldn't agree to date Edward if she wasn't attracted to and didn't like him). Because characters have distinct personalities, social statuses and needs, certain social actions are not an option for the player to select as they would be inappropriate considering the character's simulated individuality. Because of this, possible social actions are presented in a ranked list by what it is that the character would be likely to want to pursue. For example, if two people are friends, the "Be friendly to..." game will appear in the list of possible social actions while the "Be mean to..." game would not. In other words, of all the social actions possible, of which there are many, only a limited set will be available to choose from for each character. The challenge for the player is to

manipulate the social space such that the conditions are set to allow the possibility of the social state objective of the level.

Changes to the social status and the social networks have far spreading effects that modify the possibility space of social actions characters can successfully make. Even the unintended effects of a botched social interaction, like Edward being rejected if the player were to have assigned Edward the task of asking Lily to date before winking at her, create a new possibility space that may lead to an even more interesting social space and further challenges to overcome to achieve a level's objective.

CiF 2 drives this gameplay experience by simulating per character needs and traits, social statuses, social networks, social history and most importantly to gameplay, the outcomes and effects of social games. For example, when *CiF 2* determines Lily's response to being asked to date by Edward, it considers aspects of the social state like what Lily's friends think about Edward, how long they've known each other, Edward's personality traits and much more. By giving player controls to navigate a social, rather than physical, space, *The Prom* is being created to demonstrate how *CiF 2* and social games can create a practically limitless numbers of possibly compelling stories and gameplay.

5. CONCLUSION

Comme il Faut 2 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 2* 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.

Previous attempts at interactive storytelling have suffered from enormous authoring burdens with relatively limited meaningful ramifications of interaction. *CiF 2* alleviates the author from the tedious and expensive process of hand authoring specific stories with different outcomes by shifting the focus to the characters and structural possibilities of the social world. By creating a story world, rather than specific instances of stories, there are many a very large range of stories, and many that authors would likely not even anticipate. Because *CiF 2* is a rich simulation of social interactions, many individual narratives can result from interaction.

Playable prototypes, including *The Prom*, have helped develop *CiF 2* into its current incarnation. Using what we learned by interacting with the previous system, *CiF 2*'s current focus evolved from a focus on character's basic needs [11] to the social relationships and statuses between characters. Enabled by *CiF 2*, *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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