

## Social Play in Non-Player Character Dialog

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### Abstract

Non-player characters in games generally lack believability and deep interactivity. The AI system *Comme il Faut* begins to tackle this by modeling social state and behaviors for game characters. The player initiates social exchanges and the dialog and outcome are generated and displayed in their entirety. In this paper we present a model called social practices to extend *Comme il Faut*. Social practices increase the playability of social play by modeling social interactions at a more granular level and adding interactivity at each stage. This model also moves away from dialog trees to a more modular form of authoring to support the additional complexity.

### Introduction

Non-player characters (NPCs) in computer games often take the role of simple automaton, delving out information and following branching dialog trees at most. While some commercial games such as *Shin Megami Tensei: Persona 4* (Atlus, 2008) and *Elder Scrolls V: Skyrim* (Bethesda Game Studios, 2011) have worked to add some depth to NPCs interactions with the player and in-world believability, there is still much room for improvement.

The issue is compounded by the fact that adding more complexity to the NPC AI increases the authorial burden due to the increasing branches within the dialog trees. This leads to difficulty in creating and supporting interesting characters within the game.

The AI system *Comme il Faut* (CiF) (McCoy, et al., 2014), used in both *Prom Week* (McCoy, et al., 2013) and *Mismanor* (Sullivan, et al., 2012), was created as a first pass at increasing the capabilities of NPC AI by deeply representing the social state of the game world as well as the social models of behavior in the NPCs. Players choose a social interaction such as Flirt or Small Talk, and CiF uses the social models to compute the reaction of the NPC as well as the outcome and performance of the entire social interaction.

This solution sidestepped the dialog tree complexity by having the entire social interaction conversation generated and shown at once as a mini cut-scene. However, in a more traditional game setting the dialog tree complexity issue remains. Additionally, this implementation only allows interaction at the level of choosing which social interaction to initiate, but no interactivity within the social interaction itself.

We aim to use the social models found in CiF, but add lower-level interaction for deep player social impact in the decision and choice making within the social interactions.

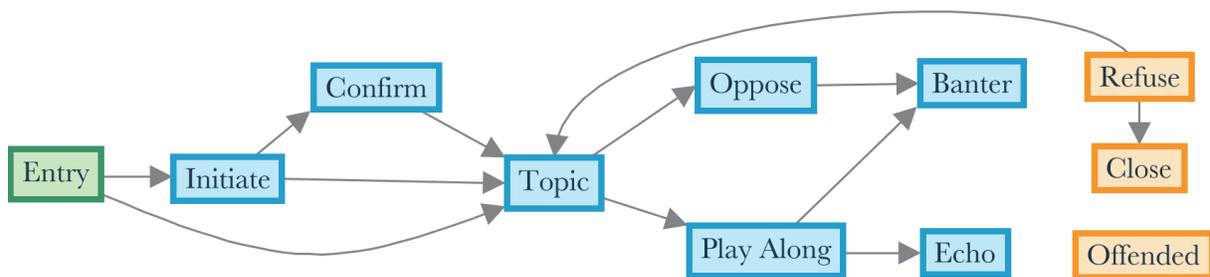
To accomplish this we extend the social models found in CiF creating a model of *social practices* that are playable at a more granular level. Instead of choosing a social interaction and watching the entire interaction play out, the player and NPC take turns choosing actions at each stage of the social practice. This level of interactivity continues until the social practice has concluded.

To support this from an authoring perspective, the dialogue is no longer written for specific characters, but instead can be retargeted to the various NPCs. This breaks away from the standard tree structure, and allows for a deeper generative space and more believable characters. It also allows us to address action-to-action consistency and coherence within the procedural space to prevent moment-to-moment character amnesia that can be common in dialog-tree driven systems.

In this paper we present details on the social practice model and how it is playable at a more granular level than the original model in CiF. We also present an example of a social practice and discuss the proof of concept visual novel we are creating using this system as well as future work.

### Related Work

While successful computer role-playing games like *Elder Scrolls V: Skyrim* provide engaging experiences with beautifully realized worlds, pre-authored dialogue trees dominate the story and social worlds of AAA games. The *Persona* series is one of the few examples of games released by AAA studios to allow player choice to impact the story.



[Figure 1] Shows the high-level stages within the Small Talk social practice. Entry is where the social practice is initiated. Each stage contains multiple actions available to the player or NPC with the actions able to change the states. Offended is an example of an event.

For instance, *Shin Megami Tensei: Persona 4* featured a system of social links between characters that can be modified when the player takes certain actions. The effect player actions have on the social links between characters is set ahead of time by the author.

Some independent and academic games allow for more meaningful interactions by the player in which they interact with and impact the social aspects of their story worlds. *Prom Week*, *Faade* (Mateas & Stern, 2005) and *Blood and Laurels* (Short, 2014) each allow for a larger range of possible player interactions that have meaningful impact to in the story world. As a consequence, these games have progressed social interaction systems past the pervasive dialogue tree representation, but do not break the social interactions down to a more granular level.

Several artificial intelligence systems provide stronger playable models of the social spaces. Some of these systems provide the foundation for experiences: FATiMA (Dias & Paiva, 2005) is an agent-based architecture behind *FearNot!* (Aylett, et al., 2005) and *ORIENT* (Aylett et al., 2009). *Bilat* (Kim, Jr, & Durlach, 2009) was built on PsychSim (Marsella, Pynadath, & Read, 2004) and CiF is the underpinning for *Prom Week* and *Mismanor*. Similarly, the system Praxis (Evans, 2013), with its authoring language Prompter is behind *Blood and Laurels*. These systems all work towards a similar goal as our work, but we are presenting a deeper interactive model of social practices.

The work in this paper allows for deeper playability in dialogue interactions as seen in the mentioned AI systems while keeping the end performances coherent like those of pre-authored dialogue trees of computer role-playing games.

### Social Practices

A social practice is a normative pattern of social interaction that captures the nuances that result from the individual agent’s situation in the social state. The particular path through an instance of a social practice is not strongly pre-authored, and instead the path is generated. Rather than adhering to a static branching tree structure, or a state ma-

chine with transition rules, a sophisticated selection mechanism is used to determine an agent’s response to the previous action and current social state. A model of socio-cultural norms as well as the authored structure of the individual practice drives this mechanism.

The model of a social practice is made up of a set of linked stages. Each stage consists of a set of actions that are authored to express an agent’s intent. Actions are made up of an effect, a performance and sets of influence rules (described below). Each effect for an action moves the social practice a new stage.

In a social practice, two participants take turns being the active character. The social practice is initiated by one of the participants. To do this, the participant is presented a choice of actions to initiate the social practice and the selected action is realized via a performance. From there, the social state is modified to reflect the effects of the chosen action. Then, the active participant is switched and presented a list of actions based on the current stage of the social action. When a non-playable character is the active participant, the action is chosen using a selection mechanism that is described below in the Scoring Actions section.

When an action is taken, the social state is modified to reflect the agent’s response via the action’s effect. Examples of social state changes are, "record that the X was rude to Y" or "raise the trust between the X and the Y by 5." An action’s performance is simply the dialogue, animation, or visualization the game needs to express to the player that the action has occurred.

### Events

In addition to the linked stages, at every choice point a collection of event stages are considered. These stages are used to catch situations that fall outside of a normative social pattern. For example, if two agents are bitter rivals, an event stage of rejection could be authored to perform the responding agent dislikes the initiating agent and ends the practice early.

## Scoring Actions

Transitions between stages are determined by considering all of the possible actions in the linked stages and choosing the one with the highest scoring volition. Scoring is achieved by summing four values: the practice specific bias, the microtheory rules, the action influence rules and the previous action's carry rules.

The *practice specific bias* is how the normative flow between actions is introduced. It is a weight that represents the situation of two agents that don't have any particular social relationship and determines the most routine path through a practice.

*Microtheories* are collections of influence rules. An *influence rule* is made up of a left and right hand side. The left hand side is a condition that looks over the social state, and the right hand side is a weight that should be applied to a specified intent when the condition is true.

As an example, a microtheory could define an agent's desire to "demonstrate friendship." A possible influence rule in the microtheory is "if X was nice to Y recently, add four to X's intent to demonstrate friendship to Y."

An *action's influence rules* take the same form as the microtheory rules described above, except the weights are only relevant while scoring the action they are associated with.

Likewise, *carry rules* are influence rules in which the weights are only relevant while scoring the next, following action.

A practice is complete once there are no further linked stages in the current stage of the action that was performed (and thus no actions to consider).

## Discussion

We are currently applying social practices in a visual novel style game prototype. In this game, the player engages with an unknown culture and attempts to navigate through social interactions with the NPCs. We are able to encode the alien culture as a set of microtheory rules and the player initiates and moves through social practices with the NPCs.

Because social practices are designed to be retargetable and the particular way that the practice will unfold reflects the individual NPC's state as well as the player's social history. We are finding that this modularity is very useful for scaling. For example, once the "Small Talk" practice is completed, the practice can be applied between the player and any other NPC.

A downside is that completing a robust practice is a significant undertaking and involves a lot of abstract reasoning and imagination. Future work will involve investigating authorship and creating guidelines for exploring the space of a social practice.

As of now, a practice must be taken to completion before another practice can be initiated. This does not reflect

real social interaction and is a limitation of the current system. Further future work will be to explore allowing agents to be engaged in several longer-term practices simultaneously.

## References

- Atlus. (2008). Shin Megami Tensei: Persona 4. Tokyo, Japan: Atlus. Retrieved from <http://www.atlus.com/persona4/>
- Aylett, R. S., Louchart, S., Dias, J., Paiva, A., & Vala, M. (2005). FearNot!: An experiment in emergent narrative. In T. Panayiotopoulos, J. Gratch, R. Aylett, D. Ballin, P. Olivier, & T. Rist (Eds.), *Proceedings of the Fifth International Conference on Intelligent Virtual Agents* (Vol. 3661, pp. 305–316). Springer Berlin Heidelberg.
- Aylett, R., Vannini, N., Andre, E., Paiva, A., Hall, L., & Enz, S. (2009). But that was in another country : agents and intercultural empathy. In *Proceedings of AAMAS 2009* (pp. 329–336). Bethesda Game Studios. (2011). *The Elder Scrolls V: Skyrim*. Rockville, Maryland: Bethesda Game Studios.
- Dias, J., & Paiva, A. (2005). Feeling and Reasoning: A Computational Model for Emotional Characters. In C. Bento, A. Cardoso, & G. Dias (Eds.), *EPIA* (Vol. 3808, pp. 127–140). Springer.
- Evans, R. (2013). Introducing PRAXIS: a statically-typed logic-programming language for modelling social practices. Oxford. Retrieved from <http://www.cs.ox.ac.uk/seminars/841.html>
- Kim, J., Jr, R. H., & Durlach, P. (2009). BiLAT: A Game-Based Environment for Practicing Negotiation in a Cultural Context. *International Journal of Artificial Intelligence in Education*, 19(3), 289–308.
- Marsella, S., Pynadath, D., & Read, S. (2004). PsychSim: Agent-based modeling of social interactions and influence. In *Proceedings the International Conference on Cognitive Modeling*. Pittsburgh.
- Mateas, M., & Stern, A. (2005). Structuring Content in the Façade Interactive Drama Architecture. In *Artificial Intelligence and Interactive Digital Entertainment (AIIDE 2005)* (Vol. 3). Marina del Rey, CA.
- McCoy, J., Treanor, M., Samuel, B., Reed, A.A., Mateas, M. & Wardrip-Fruin, N. (2014). Social Story Worlds with Comme il Faut. In *IEEE Transactions on Computational intelligence and AI in Games*. 6(2), 97-112.
- McCoy, J., Treanor, M., Samuel, B., Reed, A. A., Mateas, M., & Wardrip-Fruin, N. (2013). Prom Week: Designing past the game/story dilemma. In *Proceedings of Foundations of Digital Games (FDG 2013)*. Chania, Crete, Greece.
- Short, E. (2014). *Blood and Laurels*.
- Sullivan, A., Grow, A., Mateas, M., & Wardrip-Fruin, N. (2012). The design of Mismanor: creating a playable quest-based story game. In *Proceedings of Foundations of Digital Games (FDG 2012)*. Raleigh, NC.